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INDIA RUBBER WORLD

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Volume 95 **New York, January 1, 1937** **Number 4**

Contributors to Rubber Compounding Progress

New Central Laboratory and Technical Facilities of Godfrey L. Cabot, Inc.

D. C. McRoberts

THE fundamental necessity of the application of the searching principles of science to the continued improvement of the manufacturing efficiency and the usefulness of industrial materials is appreciated no more fully than by a business executive who possesses a trained scientific mind. To this important fact can be traced the reason for the existence of that most thoughtfully planned central research and physical testing carbon black laboratory recently expanded and rebuilt by Godfrey L. Cabot, Inc., in a new and convenient location at 49 Beach St., Boston.

The Scientist Executive

In active directional charge of the company which bears his name is Godfrey L. Cabot, the company's founder. Associated with the history of his early higher educational endeavors, which in fact still continue, are distinctive scholastic honors and a collection of degrees, which serve to accredit the extent, no less than the variety of mental pursuits immediately suggested by the institutions which he attended: Massachusetts Institute of Technology, Harvard, and Zurich Polytechnicum as a former student or present officer, he also has added collegiate interests.

Organization Personality

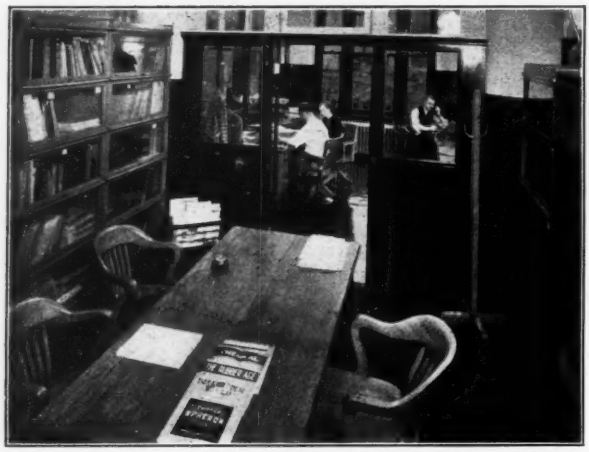
The thoughts, the habits, and the characteristics of the directing executive of an institution determine the type of personality of that institution; and institutions, like people, do have personalities.

Such remarks as appear in this article pertaining personally to Godfrey L. Cabot, the man, are not here in the biographical sense at all. If they were, very much more of good would need to be said, but which in his modesty he would not permit. Instead they are meant to reveal in small part the qualified personality of an institution, Godfrey L. Cabot, Inc.

Godfrey L. Cabot, besides numerous varying accomplishments, is a profound scientist by training and by practical industrial application and the first with such a viewpoint to enter the carbon black business. He began addressing his training to the "soot" business in the carbon black pioneering days of 1882 associated with a company founded by his brother, Samuel Cabot, in Worthington, Pa., which Godfrey Cabot personally acquired in 1887.

A Natural Gas Specialist

While problems relating to improved carbon black production methods advantageously engaged a portion of the attention of the young scientist, those concerning natural gas itself were considered by him then to be of major significance to the future of the industry, and to these he gave time commensurate with his idea of their relative importance. Not only did this course of reasoning prove of value in the resulting improved conservation of gas use then, but it led to a knowledge of gas characteristics and occurrence conditions that have produced widespread and continuing benefits to the economics of the carbon black and related industries during all the intervening years since.



The Pleasant Laboratory Office with Adjacent Reference Library

Carbon Black Assumes Industrial Proportions

Since his induction into the business Mr. Cabot's interest in the production and development of natural gas sources and carbon black has been continuous. While the superior color and covering power of carbon black, as compared with soot and smudge blacks, had been known since 1864, when the former was discovered, its manufacturing cost was such as to prohibit extensive adoption for many years to come. Practical experimenters accomplished enough regarding the possibility of making carbon black to effect reductions in its cost from approximately $5 per pound in 1864 and $2.50 in 1872 to the remarkably low price of 31¢ per pound in 1882, when consumption had reached the unprecedented total of about 1,000,000 pounds per year.

View of Analytical and Chemical Research Laboratories—Vacuum Bench at the Right Is Used for Gas Research

Science Enters the Industry

At this time the technical point of view joined hands with the older and valuable practical ones to continue the aggression against wasteful practices and to lower costs. The effects were pronounced. By 1887 the price was 7¢ per pound, with evidence of supply running ahead of demand, thus causing the undesirable price of 4¢ per pound in 1889. Equalization of these economic factors was reestablished by 1892, however, when the then-equitable price of 6¢ prevailed and consumption had grown to approximately ten millions of pounds per year.

Technical Service Policy Originates

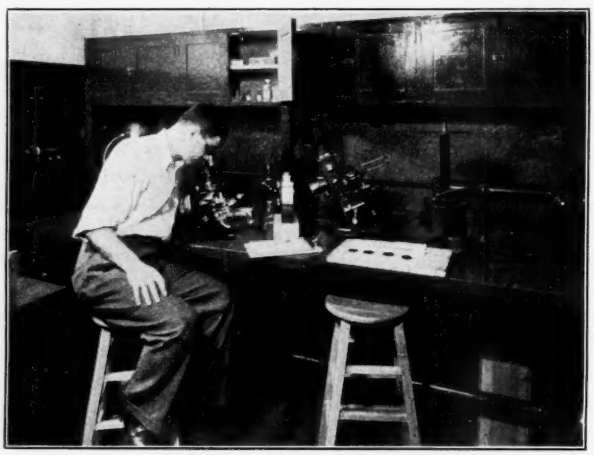
During this period Mr. Cabot's influence was directed not only to his problems as a producer, but to the technical ones of the consumer as well, a principle that to this day has remained an especially important policy of all the branches of his business. The technical departments that he has required have been fitted carefully in number, size, equipment, and personnel to the current size and outlook of his own business, with consideration also of the actual immediate and probable future needs of the customers being served.

The Cabot Company's Growth

Acquiring characteristics fashioned after its guiding officer, the Cabot company grew in size and respect and became an important and beneficial influence not only in the carbon black industry itself, but also in all others which it served. With the development of new gas markets the carbon black manufacturing activities migrated to the more remote and more prolific gas fields, where the supply of raw material was sufficient for the growing needs. From Pennsylvania the Cabot interests spread into West Virginia, where from 1900 to 1916 Mr. Cabot's Gransville plant with a capacity of 10,000 pounds per day was the largest in the world. Migration of the industry continued through Louisiana on to Texas and Oklahoma where six plants of Godfrey L. Cabot, Inc., now produce a substantial proportion of the more than 350 millions of pounds of carbon black consumed per year. The largest of these, and incidentally the largest in the world, is the Bowers factory at Elfco, Texas, which has a capacity of 110,000 pounds per day.

Many Industrial Applications

Prior to 1914 the use of carbon black was limited to the ink, paint, polish, and explosives industries, with the exception of an insignificant quantity then used for coloring certain rubber compounds. Since that time, however, it has become the most important reenforcing constituent known for rubber. While the former uses continue, and in increased quantities, still the volume used in the rubber industry is by far the greatest. By percentage the proportions are about as follows: the rubber industry 85%; the ink trade 9%; paint, varnish, and lacquer activities 3%; and miscellaneous products, as paper, polishes, crayons, artificial leather and leather finishes, carbon paper, explosives, linoleum, plastics, etc., 3%.



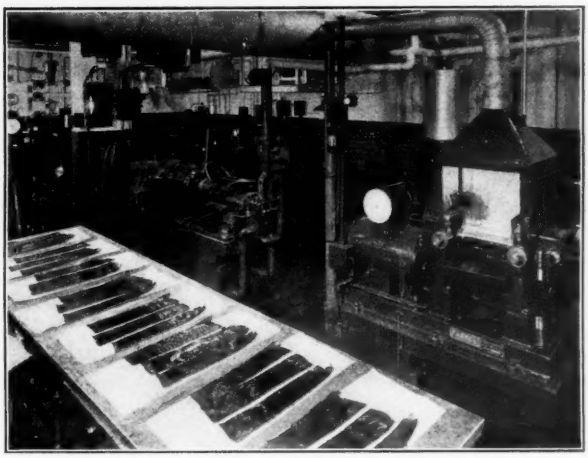
Microscopic Room; at the Right Is the Nigrometer Developed in Collaboration with Massachusetts Institute of Technology

Varied Technical Requirements

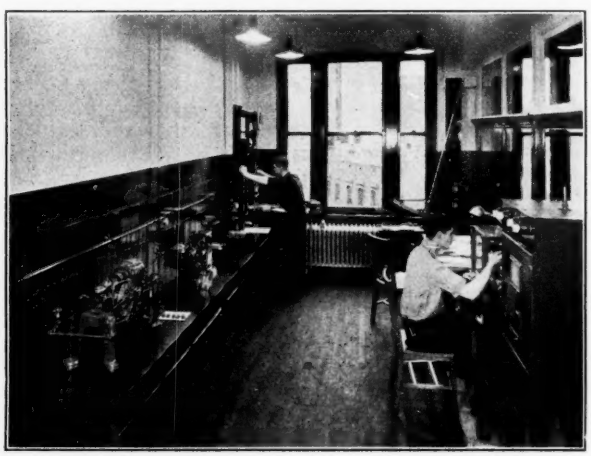
Even a cursory consideration of the important applications of carbon black to the great number of products in so many unrelated industries is sufficient to emphasize the responsibility of the carbon black manufacturer who insists upon having a technical organization versatile enough to render competent chemical, physical, and practical assistance in each case. This point is further emphasized when consideration is also given to the fact that the personnel and equipment of the technical department must be specialized in the problems of carbon black production control and research. Godfrey L. Cabot, Inc., has such a technical organization, which, as it stands today, is the evolutionary reflection of the understanding and directional influence of the company's chief throughout all the years since he personally carried on such activities in 1882.

Technical Organization

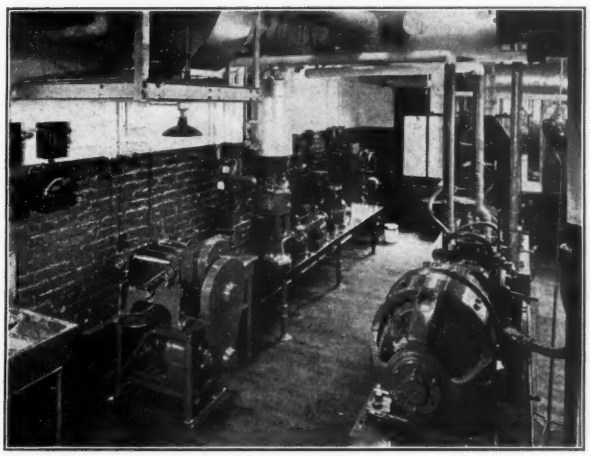
As has been previously stated, the technical facilities of this company since its beginning have been fitted carefully to the current needs of manufacturing carbon black and its uses. From a small beginning in a single location the technical department has grown to a larger and more complex structure with the growth and migration of the production activities and the expansion of new uses and their more exacting technical requirements. Today the technical organization consists of seven laboratories, one each at six plants and the new central research and control laboratory at Boston, employing a full staff of technical specialists for the various industries being served. The equipment included in these institutions cover practically all types of chemical apparatus, physical testing devices, and optical instruments known for the research, evaluation, and control of carbon black, its methods of production, and of use in the rubber, ink, paint, and other industries.



The Rubber Mill and Banbury Mixer Are Fitted with Powerful Variable Speed Motors and Every Type of Control Device Now Known to Eliminate Variables in Mixing Studies



A View of the Rubber Testing Department in Which Equipment Exists Comparable to That in Rubber Company Laboratories



A View of the Mill Room Showing a Portion of the Numerous Types of Ink, Paint, and Rubber Working Equipment

Of the plant laboratories four have only control functions and facilities; while the two remaining ones perform similar functions on a large scale and in addition do product and process development work on all types of black.

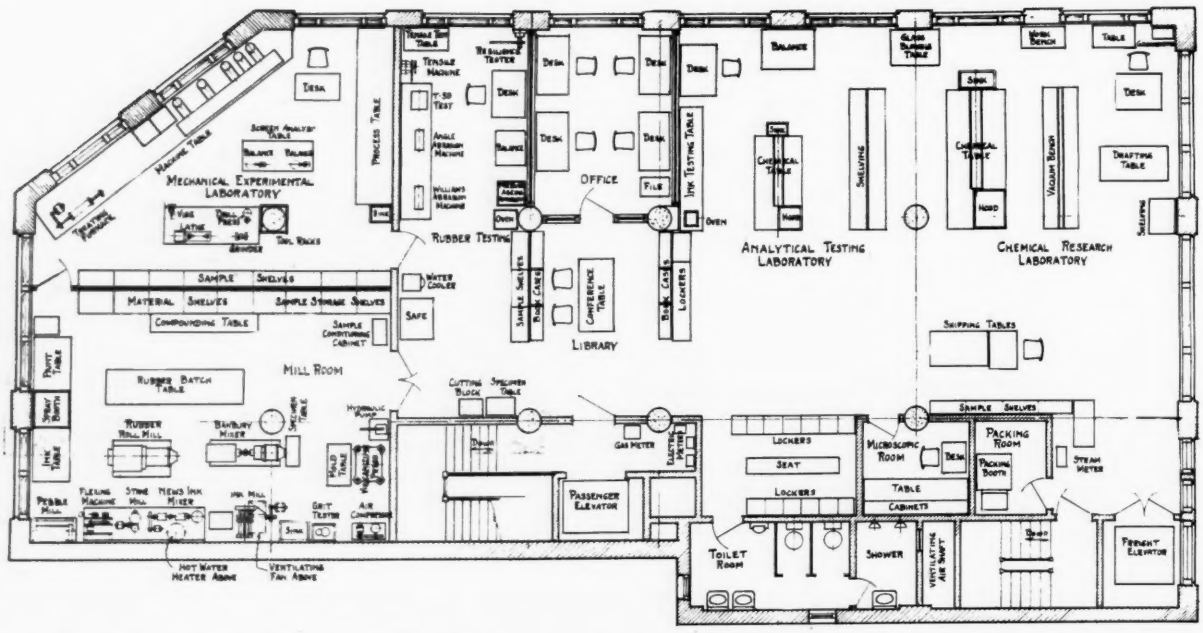
Central Research and Control Laboratory

Functionally the technical headquarters of the company reside in the Boston organization. Here the central laboratory has been recently enlarged and rearranged in a new home, the location and type of which were chosen with regard to the convenience of contacts, the comfort and welfare of workers, the fitness of surroundings for good work, and the suitability of materializing plans for proper work segregation and flow.

Extending above adjacent buildings the tenth and top floor of a modern structure—only a few minutes' walk from the company's main office—houses the present scientific headquarters. Under the engineering direction of Charles T. Main, Inc., engineer of the Spectroscopy and Eastman Research Laboratories at Massachusetts Institute of Technology, this laboratory was planned and installed.

Laboratory Arrangement

The accompanying floor plan diagram shows clearly the well-defined and accessible departmental arrangement and also the relative locations of each type of equipment. It will be observed that the office, with reference library at the entrance, is directly opposite the stair well and elevator. Full glass partitions, above desk height, afford the best daylight advantages as well as an unobstructed view of a major portion of the laboratory departments. All equipment within the range of vision is of types the operation of which is attended with relatively little noise or uncleanliness. Procedures which by their nature necessitate disturbing noise and dirty conditions, such as rubber, paint, and ink mixing, curing samples, flexing tests, lac-



Floor Plan of the New Central Research and Control Laboratory of Godfrey L. Cabot, Inc., Showing Equipment and Departmental Arrangement—Noiseproof and Dustproof Walls Segregate Heavy Machinery and Grimy Operations from Other Departments

quer spraying experiments, etc., are grouped together and segregated from the other work in the mill room behind soundproof and dustproof hollow tile partitions. This is also true of the mechanical experimental department where, in addition to the probability of noise and dirt, there is a likelihood of privacy at times being desirable.

A large proportion of the three outer walls of this laboratory consists of windows, which because of the absence of outer obstructions permit an abundance of direct natural light. When artificial light is required, it is provided by lighting fixtures of the most modern "daylight" variety.

The equipment of this laboratory is of such well-known varieties and so well shown in the diagram as to warrant little discussion. In the mill room the neat and complete manner of hooding and exhausting the variable speeded roll and Banbury mixers is unique, effective, and therefore of special interest, as is true also of the specially designed device for force feeding the Banbury, which permits more accurate time cycle mixing operations.

The Mechanical Experimental Laboratory

Apparatus of varying and frequently changing kinds is to be found in this department. It is a variety of miniature plants where the principles of new processes, and new equipment are given their first walking lessons. Many falls are expected and experienced here, but out of them occasionally comes a development of the proportions of Spheron. This, as is quite generally known now, is a dustless form of pelleted carbon black formed by a process of mechanical agglomeration.

Microscopic Room

Of special interest in this department is an instrument developed in collaboration with the Massachusetts Institute of Technology, known as the Nigrometer. By means of this device the degree of blackness can be determined accurately and expressed numerically. The personal equation is entirely removed. The value of this instrument in ink and paint materials evaluation can be readily appreciated. In evaluating carbon blacks for rubber it is now considered of much importance as some relation is believed to exist between the degree of blackness and the fineness and other properties of value in rubber compounds.

With an eye to the improvement of processes and materials for the bettering of service to various industries Godfrey L. Cabot introduced scientific development principles to the conduct and performance of the carbon black business in 1882. With an eye to the same objective during the years since he has instilled that creed into an organization of people composing Godfrey L. Cabot, Inc. This new laboratory is a most fitting tribute to the leadership of Mr. Cabot and to the principles of his organization.

Anhydrous Ammonia Used in Rubber Trade

IN A report from Trade Commissioner Harold D. Robison it is stated that anhydrous ammonia consumption in British Malaya for the prevention of coagulation of rubber latex has shown a steady increase. While import statistics do not carry a separate classification for anhydrous ammonia, it is estimated from export statistics for latex that consumption during 1934, 1935, and early 1936 was at the rate of approximately 350,000 pounds annually.

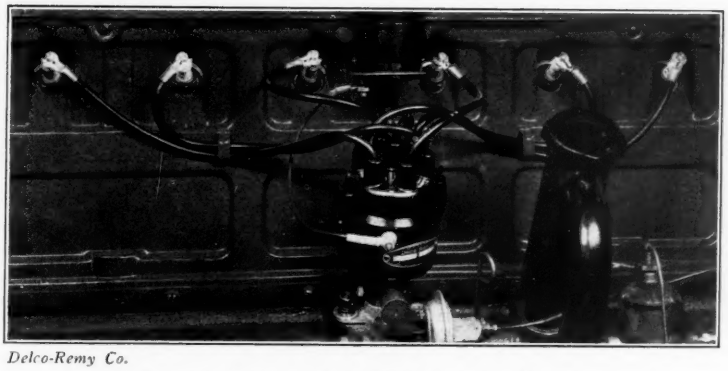
If latex for export is concentrated, it will contain about 60% by weight of dry rubber; if unconcentrated, about 38%. Thus to prevent the coagulation of one ton of dry rubber, in the form of concentrated latex, about 25 pounds of anhydrous ammonia are required. For one ton of dry rubber in the form of unconcentrated latex about 38 pounds are required.

Factors in the rubber trade generally believe that the exports of latex in liquid form will continue to increase as it is more economical to ship in this manner. At present the trade has been confined to four or five concerns, but many others are much interested in the developments. *Chem. & Met. Eng.*

Protective Coating for Automotive Ignition Cable

J. Delmonte[1]

THE specialized requirements of automotive ignition cable are among the most severe in the cable industry. Subject to the heat of the engine and the deleterious effects of organic liquids and gases, the protective coating of automotive ignition cable must fulfill those requirements of corona resistance and high voltage stress. A high quality rubber insulating compound is required to withstand the brunt of these conditions.



Delco-Remy Co.

Automotive Ignition Cable Extending from Distributer

To make the picture more complete the automotive ignition cable must be pictured as extending from the distributer to various spark plugs on each engine cylinder. The voltage impressed on this cable is in the order of a few thousand volts, which are required to cause a spark to jump across the spark gap and ignite the air-fuel mixture in the engine cylinder. A very heavy insulation of rubber compound is applied about the conductor to maintain as high an insulation resistance as possible, insuring a minimum loss of electrical energy from the conductor to the metal structure of the engine, which is grounded. In addition, the cable must possess sufficient flexibility to bend sharply about various engine accessories to reach the spark plugs. A stranded conductor and rubber sheath have no difficulty in meeting this requirement. On top of all of this are the high temperatures concomitant with engine operation, and the presence of oil, water, and gasoline vapor.

At normal temperatures of the atmosphere and during operation in pure air and low voltage stress, rubber insulation is quite satisfactory. In its application to the automotive ignition cable the following problems had to be overcome:

Tendency of the rubber to swell when immersed in gasoline. The increase of porosity of the dielectric with swelling, led to an early breakdown of insulation as high test voltages were applied.

Deleterious effects of ozone upon the rubber insulation. The effects of ozone upon rubber are well known, as the O_3 molecule renders rubber unsuited for insulating purposes. It is considered a more serious factor to effective rubber insulation than applied high voltages at high temperatures.

Tendency to become brittle with age, heat, and ozone. The cable should not crack under the stresses to which it may be submitted while sharply bent to position in its application.

Absolute uniformity of insulating qualities and even application of insulating compound about the conductor.

Special high dielectric strength rubber insulation has been designed for automotive ignition cable application. The effectiveness of the rubber insulation was enhanced by the applied protective braid or synthetic rubber, over the rubber sheath. In so far as the synthetic rubber is concerned, best results have been obtained to date with a high quality rubber core covered by a "DuPrene"[2] external sheath. In the lacquered braid protective coating a varnish of high dielectric strength impregnates the woven cloth. On top of this is a lacquered coating, about 10 mils thick, of either a cellulose derivative or synthetic resin, to which has been added a softening agent to make it more pliable. In particular the chief advantage of these applied sheaths over the rubber core lie in the fact that they are resistant to ozone, excluding it from contact with the rubber, and impervious to oil, gas, and water. The various cable manufacturers have their special formulas for the protective coatings, but a few generalities will serve to indicate the nature of these compounds.

To get some idea of the standard type of construction for ignition cable, the data which are given below may be cited:

Diameter of Conductor, No. 16 gage..... (19 Strands No. 29 tinned Copper Wire)	=	0.060-inch
Diameter over the Rubber Insulation.....	=	0.235-inch
*Braid and Protective Compound Diameter over the Completed Cable.....	=	0.270 to 0.290-inch

*Sometimes the heat, oil, and corona resistant compound is followed by a cotton braid saturated with an abrasion resistant compound. To maintain the same overall diameter the conductor size may be decreased to allow more rubber insulation to supplant that space taken up by the additional braid. The specified diameter in the above tabulation should not be taken as a hard and fast rule, as it will vary with the type of construction, ranging in sizes from 0.235-inch to 0.355-inch in diameter. However it is of interest to note that a high quality rubber insulation forms the greater bulk of the ignition cable in every case.

The high voltage dielectric strength and corona tests to which the various cable manufacturers submit the cable are of interest in that the efficiency of the insulation is proved under trying conditions. The high voltage tests as employed by various cable manufacturers are given herewith in Table 1.

(Continued on page 48)

[1] Electrical engineer.
[2] Trade mark registered.

World Stocks of Rubber

DURING the days when the world's rubber came from forest trees, from about 1840 to 1910, there was a constantly greater scarcity of rubber and a constantly rising price. The year 1910 witnessed a price above $3 a pound for the commodity, and the decline from that peak marked the first important influence of plantation rubber.

From 1910 to 1914 supplies of rubber were becoming more readily available, and the price trend was rapidly downward. Thereafter until the end of 1918, however, the downward trend was gradual, and the price of rubber did not drop below 50¢. At the end of 1919 estimated stocks of rubber represented about 5½ months' supply, doubtless the first time this had ever happened in the history of the industry. *During the World War supplies had never been plentiful in consuming markets, and marketing agencies had therefore never become experienced in handling large stocks.* At the end of 1920 the estimated stocks approximated 10 months' supply, and the price had fallen below 20¢ a pound; this stock increase resulted as much from the then-declining rate of consumption as from actual volume increase in stocks. Beginning November 1, 1920, voluntary restriction by agreement among leading producers as individuals, to the extent of 25%, was in effect for one year; during June, 1921, the price was temporarily below 12¢ a pound; at the year-end it had appreciated to the 20¢ level, and stocks had declined to about 8¼ future months' supply.

Voluntary restriction of output was not continued; during 1922 the price slipped gradually down to a 14¢ low during August-September, but consumption was picking up, and in terms of months' supply stocks were being further reduced. With the announcement of the Stevenson Restriction Scheme, prices rose sharply during the remainder of 1922, closing around 30¢ a pound; stocks at the end of 1922 amounted to only about six future months' supply.

The history of the Stevenson Restriction Scheme is fresh in the memory of the rubber industry. It seems in retrospect that this scheme attempted to recreate a scarcity of supplies such as to result in stock conditions traditional to the years before 1919; it succeeded in this attempt, but its accomplishment was accompanied by an immediate loss of control over the price situation, which was demoralized for a full year, having far-reaching after-effects. *The extent to which stock reduction may be necessary to attain a certain price level may indeed be such as to involve inability to control price fluctuations above the level once it has been attained, when restriction is in effect. The lower the price level aimed at, the less danger of such loss of control —the higher the price, the more risk of a highly speculative market.* It is axiomatic that the ability of market operators to carry stocks is in inverse ratio to the price of any commodity —*the higher prices prevailing during the Stevenson scheme probably inhibited the development of sound economic rubber marketing agencies.* From the first quarter of 1924 to the end of 1928 there never was a time when stocks of rubber amounted to six months' supply.

Nobody with the true interests of the rubber industry at heart could desire a repetition of the loss of price control which occurred in the course of the Stevenson scheme. *The destructive whipsaw effect of rising and falling crude rubber prices on different groups in the American rubber manufacturing industry has several times been demonstrated, and in these days of large volume a sharp price change of a few cents a pound can work havoc in the profit and loss position of any manufacturer, likewise in the competitive situation among such manufacturers.* It should be fairly apparent, however, that *the natural trading practices of buyers and sellers are such as to contribute to the possibility of price irregularity in the market if supplies are much restricted or poorly distributed.* Buyers are competitive, each trying to purchase at as low a price as possible for the benefit of their individual companies. So long as rubber is available at a stated level of prices, no one purchaser can be expected to bid prices up, except under necessity. Until their stocks become depleted, therefore, they exert less than normal buying pressure on the market, buying more or less in accordance with the rate of new production. Under

PUBLICATION of its statement on world stocks of rubber December 1 places the Department of Commerce on record as having been apprehensive over the rubber supply situation as early as last June, when the article was first prepared (presumably for communication to trade representatives; however, this is not officially stated). General release of the slightly revised article was accompanied by the forthright declarations:

"Conditions considered prospectively possible when the circular was originally prepared have now become an actuality, and unless the International Committee stands ready to make quick revisions, orderliness in the market may not be maintained," and "safety and orderliness in the market can result only if the policy of the Committee is definitely one of real moderation."

The author concludes his final paragraph: "If mutual confidence and equilibrium are maintained, it will probably be the result of the closest cooperation between fully informed individuals on the Committee and in the trade, plus a policy of moderation by Committee sponsors."

With this background of candid statements from official Washington the curtain rose on the December 15 meeting of the International Rubber Regulation Committee at London. The decision to raise the exportable quota to 75% during the first quarter of 1937 and 80% during the second will tend to restore the confidence of United States manufacturers in the moderate intentions of the committee. It is to be hoped that increased exports can be physically released without delay, sufficiently to meet the increasing consumption needs and at the same time to arrest further stock depletion and the probable undesirable resulting price flurries.

conditions of restricted production the amount forthcoming is announced in advance, for a certain time, and a higher price will not for the time bring a higher production. There is only the incentive of self-protection to make an individual manufacturer maintain a high stock, and if the price is above what in this rather well-informed industry is considered a reasonable economic level, he may decide to take his risks in a fluctuating market rather than still hold stocks. *Only when buyers as a group are mostly buying from hand to mouth, may the price begin to reflect what may be real scarcity of stocks.*

Up to this time producers may have been willing sellers on a more or less stabilized market. But when the price moves upward, and the world stock position is shortened, they naturally become less willing sellers. Producing companies (like manufacturers) need to be thought of not as a group, but as a large number of individuals. Each seller, as an individual, may admit, under particular circumstances, that the price is too high for the best interests of the industry, but as a representative of the stockholders of an individual company, he will be severely criticised by them if he fails to secure the benefit of the high, and perhaps prospectively higher, prices. Merchant and speculative operators often contribute strongly to price movements at this point. When stocks are low, the market is, of course, more quickly susceptible to influence by such operators, and especially when the stocks are largely concentrated in the hands of a few holders. What happened in 1925 was that actual rubber consumption was at the same time stimulated by advance buying by consumers of rubber products, and although the exportable allowance was constantly increased, it had practically no stabilizing effect for a year.

There are other reasons in addition to normally rising, or abnormally stimulated, consumption of rubber to explain what happened in 1925, and the factor of *delay in the arrival of increased supplies in consuming markets as the result of an increased rate of permissible exports* was an *important* one. In 1925 the straitjacket inflexibility of the application of the scheme operated to prevent prompt releases by the committee to meet the situation; today the committee has authority to make an announcement or alter a previous announcement, at a regularly scheduled or special meeting, but announcements have been made only quarterly. *When the rate of production has been proceeding at a level lower than the rate of consumption, an actual vacuum exists in the stocks in producing countries and the stocks afloat,* which to be in balance with the rate of consumption would, allowing for no excess over the time elements, need to be fully equivalent to 2½ months' supply for the world, and this vacuum would have not only to be filled, but materially exceeded, before there can be material influence on stocks in consuming centers. This situation might be dealt with, if a certain stock of rubber were available, possibly even back of the restriction barrier, as a cushion to be drawn upon in case of need or at an announced price level, but the existence of such a stock would entail additional considerations and is forbidden to estates and dealers under present regulations. *The reserve stock of rubber reposes in the trees; if the rate of allowable exports were increased sharply at any time, or if several successive increases should become necessary the problem of securing and training additional labor would now be involved,* as it was in 1925-26. "Regulation" of rubber supplies "in an orderly manner," at least from the point of view of consuming interests, during a period of potential overproduction involves the provision of supplies as and when they become necessary and not merely eliminating physical rubber by stock reduction to a perhaps predetermined, but at present unknown level.

What Are Normal Stocks of Rubber?

With reference to the question of what might constitute "normal stocks" of a particular commodity, no categorical answer is possible. Certainly it is not a figure expressible in absolute terms; in terms of months' supply based on past or future consumption it might be possible for economists using data for past years to reach a fairly accurate conclusion about minimum normal stocks under normal conditions. It is less easily possible for interested parties to agree on the subject.

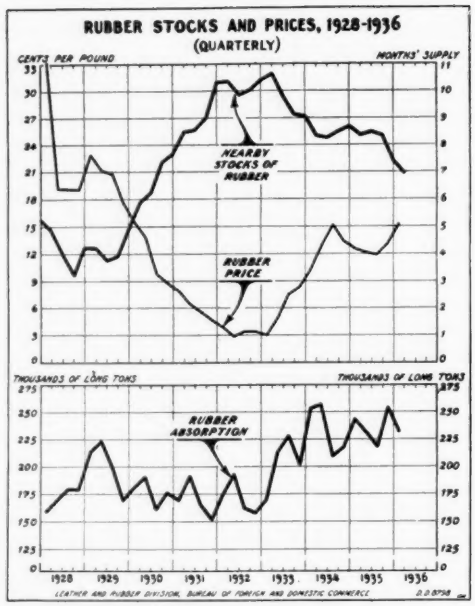
In the rubber trade this moot question was placed in the hands of the international committee, *subject necessarily to the interpretation of the complete terms of reference assented to, by the governments sponsoring the committee, as the meaning of these terms seems properly a subject for determination of those governments.* No definition as to what would constitute normal world stocks of rubber has been publicly issued by the committee, even in terms of a minimum. At the time it received jurisdiction over the question, world stocks of rubber were far larger, both absolutely and in terms of months' supply, than now. Their weight on the market has been reduced nearly as much by the increased consumption rate as by their actual reduction in quantity. Minimum normal stocks of a commodity might be defined in general terms as a supply of a commodity sufficient for the period (due regard being paid to time of initial processing, transportation, and distribution) necessary to service producers, dealers, and consumers at prices not unremunerative to the average producer and not unreasonable to consumers, under a temporary condition of close balance throughout the industry. But conditions are never static. Production and particularly consumption in this industry are fluctuating variables and never more than momentarily in balance. Producers and consumers as groups, and as individuals, are unequal in numerical and financial strength. Prices behave differently under regulation than when a market is free. Trade practices and trading methods are always in evolution. Disturbed international relations, political considerations, currency fluctuations, speculation—all influence prices in addition to conditions within the industry itself. *As a safeguard against factors tending toward insecurity, a cushion stock of any commodity, in addition to the minimum described above, is necessary in the best interest of all trade elements.* The amount of such a cushion stock necessary for practical purposes may vary considerably with conditions.

The "known" world stocks of rubber, as reported in the October *Statistical Bulletin of the International Rubber Regulation Committee,* are shown below as of December 31, 1935, and September 30, 1936, in comparison with world rubber absorption for the preceding twelve months in each case, figures being stated both in absolute quantity and in terms of months' supply for the world.

	December, 1935		September, 1936	
	Tons	Months' Supply	Tons	Months' Supply
Absorption preceding 12 months....	942,960	12.00	998,954	12.00
Stocks inside regulated areas.....	77,212	0.98	73,000	0.88
Singapore, Penang, Para, and Manaos	32,987	0.42	28,753	0.35
Stocks afloat, 1½ months' shipments	86,000	1.09	97,000	1.16
London and Liverpool warehouses..	164,295	2.09	103,962	1.25
United States total inventory.....	303,000	3.86	228,477	2.74
Manufacturers in United Kingdom.	44,666	0.57	31,658	0.38
	708,160	9.01	562,850	6.76

The stocks under the first item above are exclusive of rubber in the hands of native producers in Netherland India, Malaya, and elsewhere, stocks in Siam, and on estates in Indo-China, but are otherwise practically

complete; these reported stocks average slightly less than one month's supply for the world. Estates over 100 acres in Malaya, and in Netherland India, customarily have on hand one month's production at the end of each month, and dealers' month-end stocks inside the regulated area of Malaya averaged 108% of the amount produced monthly by small holders and natives in Malaya during 1935. These reported stocks would need to represent more than one month's supply if production and consumption were in absolute balance. *A vacuum already exists in these stocks inside regulated areas and also in stocks afloat* to the extent that they are less than 1.33 months' supply at current consumption rates; while trading stocks in Singapore and Penang have been reduced to a level practically lower, relative to present-day trading volume, than it was during 1925. The total stocks included above represented 6.76 months' supply September 30, having declined 2.25 in the preceding nine months.



Since about 40% of the rubber used annually is consumed in other countries than the United States and the United Kingdom, the stocks of rubber held by dealers and manufacturers in those countries is a factor of importance. Except for Japan, Canada, Australia, Argentina, and a few countries of less importance, the other consuming countries are European. In the past 15 years stocks in these countries never have played an important part in the world rubber situation, and they are in general unknown. They might at times be considered as a possible source of limited amounts of surplus rubber, but at present more properly from the point of view of *a certain vacuum in necessary rubber supplies possibly already existing there.* It is from this latter viewpoint, in particular, that a careful analysis of the present world rubber position involves consideration of *all* "world" stocks properly so-called.

Position as Shown by Committee Statistics

The treatment accorded stocks in the *Statistical Bulletin* published by the international committee shows that the committee uses a certain months' supply formula in its deliberations and implies that it is thinking particularly in terms of stocks *outside* the regulated areas. As already pointed out, stocks *inside* those areas and stocks afloat and in other consuming countries than the United States and the United Kingdom have a definite bearing on the position.

It would seem well worth while to examine carefully the position revealed by the set of statistics being used by the international committee. From January, 1928, when announcement was made that the Stevenson Restriction Scheme would be discontinued after October 31 of that year, trading conditions approximated those in a free market, and price levels responded to ordinary economic and psychological influences until shortly before the present Regulation Agreement was made effective June 1, 1934. While no official pronouncement as to what price level is aimed at has been made by the committee, unofficial representatives of the producing industry, which has now survived a long depression with the price for a lengthy period under 5¢ a pound, have mentioned 8d. or 9d. rubber as a satisfactory goal on various occasions, and the price for some months was fairly stable *between* 15 *and* 16¢, at which level *efficient producers should not fail to earn satisfactory profits.* The period prior to 1928 is not comparable with the subsequent period; nowadays nobody in the industry seriously discusses a 40¢ price for rubber although it is realized that such a price could easily result if stocks became too much reduced and other conditions concurred to stimulate the market and if remedial measures were not promptly taken by the committee.

(In the original report of the Department of Commerce[1] statistics "closely comparable with those used by the International Committee" were published at this point, accompanied by the chart reproduced herewith, which shows the relation between months' supply of stocks outside restriction areas with New York market prices, and quarterly rubber absorption throughout the world.)

In 1928, although restriction was not officially abandoned until November 1, the trading conditions after the first quarter approximated those in a free market. Despite the sharp decline in reported stocks it was generally known during the year that large stocks were piling up behind the restriction barrier in Malaya and Ceylon; and despite rising consumption of rubber, prices shaded off gradually. The rate of consumption was so high in 1929, however, that the clearance of stocks and high production in Malaya and Ceylon scarcely sufficed to meet trade requirements; in the early months there was a real shortage of rubber in America for a time, and until the continued high rate of exports proved how much more rubber could be produced than had been realized during the course of the Stevenson scheme, prices continued higher than during 1928. The depression began in the last quarter of 1929, and from that time to the end of 1931 stocks of rubber increased rapidly in terms of months' supply, the increase being partly the result of declining consumption. During 1932 production and consumption remained closely balanced; the recovery in consumption starting in 1933 soon reduced months' supply nearly two months despite an absolute increase in the tonnage of stocks, which reached its highest point at the end of 1934. Since then the decline in months' supply has been wholly the result of regulation of production at a level well below the rate of world consumption.

The price of rubber moved inversely with the months' supply of the commodity. The bulge in price in early 1929 was caused partly by the very high rate of absorption then prevailing. Again in 1933 and the first three quarters of 1934 prices moved upward more rapidly than the rate of decline in world stocks perhaps warranted, and this trend also coincided with a period of very rapidly rising world absorption. So long as months' supply remained steady in 1935, prices showed a declining tendency, partly in reaction from the too-rapid rise in 1934. *Months' supply is the chief key to rubber prices;* while the rate of

[1] Circular No. 3,627, Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, D. C.

consumption of itself appears an additional influential factor at times.

One very important thing that the chart would seem to indicate is that under the free market conditions in 1929-1930 the line of months' supply crossed the price line at a level of around 15¢ and slightly more than five months' supply; while under present conditions of restriction of production it appears likely the lines may cross at a slightly higher price and near six months' supply. This would support the theory that *more stocks are necessary for security in a regulated rubber market than in a free rubber market.* Much more conclusive evidence is afforded by comparing what happened in 1925 with what took place in 1928 and 1929, at times when these stocks were temporarily under four months' supply. If this evidence seems inconclusive, the following conclusions drawn from analysis of the chart would appear sufficient to settle the point.

A four months' supply in the free market of 1929 was about equivalent to a price of 21¢. A five months' free market supply, with prospective further excess production, meant a price of about 16.5¢ at the end of 1929. A six months' free market supply, at the end of the first and second quarters of 1930, with prospective further excess production and prospective devaluation of British currency, resulted in a price around 13¢. A free market supply of about 7½ months' in the last half of 1930 resulted in a price of about 9¢. An 8½ months' supply in the first half of 1931 brought the price of 6¢; a nine months' supply to 5¢, and over ten months' supply to 3¢.

With recovery under way and talk of restriction a nine months' supply brought the price to about 9¢ at the end of 1933; and 8½ months' supply with restriction in effect caused a price in the neighborhood of 12¢ (at the low); while a seven months' supply in the first quarter of 1936 has meant 15¢ rubber. At the end of 1927, under the Stevenson scheme, a five months' supply was accompanied by a 40¢ price. It would therefore seem that *a reduction of these stocks below the six months' level by decisions of the committee would indicate a desire to raise prices above a level of* 18¢. *A real test of the committee's intentions and capacity for orderly regulation will doubtless come during the next nine months.*

It is usual for consumption to be lower in the last half than in the first half of the year, but the chart shows several variations from this normal condition in the past. With permissible exports at 65% about 30,000 tons more rubber should be produced in the last half of 1936 than in the first half, but even with this, further shrinkage in the months' supply at the year-end is to be expected. Apparently *the statistical position is already such as to call for careful handling by the committee,* if it cares to maintain a reputation with consumers for moderation in the application and operation of the scheme. Its task from now on, *assuming its aim is primarily to aid the producing industry to work out its modernization in an orderly manner and not practise undue exploitation of rubber consumers,* is far more difficult than it has been; thus far the committee has proceeded in one direction only, that of stock reduction, but *from now on it is really necessary in order to maintain equilibrium that it be willing to move quickly in the opposite direction upon occasion.*

Whatever course its decisions take, they are not unlikely to meet criticism from one or other of the trade elements *affected. Producers naturally want as much profit as can* be safely obtained. Consumers, fairly well advised as to average costs of rubber production, naturally resist paying highly profitable prices for a commodity that has much surplus production capacity, and their resistance may find practical expression in use of substitutes, as it usually does. On the other hand dealers in rubber thrive on a rising market particularly, but find little prosperity on a stable market, and a long continuance of stable prices would quite possibly further reduce the already too-weak marketing structure for rubber. It is probably the case that *an important direct cause of resort to government control in rubber is the lack of sufficient marketing structure on the part of producers and dealers. Does the existence of government control inhibit the development of such a structure?*

The Bureau of Mines, Interior Department, has for several years published statistics relative to carbon black production, producers' stocks, and shipments. This material is used chiefly in the rubber industry, but in most other respects it is in contrast to, rather than comparable with, crude rubber. It is a product of manufacture, and not of agriculture; production of carbon black has been always capable of rapid increase. Producers are in close proximity to their domestic market and not so very remote even from their export markets, which account for less than 40% of the consumption; such conditions would seem to warrant smaller stocks than would appear necessary for rubber. Middlemen play no important part in domestic distribution of carbon black; the producer usually sells directly to the consumer in bulk; whereas merchants are an important factor in rubber.

Production of carbon black is concentrated in the hands of strong companies. Demand has been influenced more or less in accordance with the demand for rubber in the tire industry, in respect to which the material is comparable to rubber. There are no technical production problems that make carrying of high stocks essential to the carbon black producers; there is merely the necessity or desirability of serving their customers promptly at reasonable prices.

Yet year-end *producers' stocks alone of carbon black have averaged* 5.26 *months' supply,* based on total shipments for the same years, during the period of 1923 to 1935 inclusive, *but excluding the years* 1930, 1931, *and* 1932, *when stocks were admittedly excessive.* Stocks in transit, in the hands of domestic and foreign consumers, and limited stocks held by distributers, must have accounted for an additional one month's supply on the average, at least, making a total of over six months' supply. Is it unreasonable to think that nearby stocks of rubber need to represent at least an equal number of months' supply?

Demand fluctuates widely for carbon black just as it does for rubber, the annual changes from the preceding year varying between the limits of a 16.6% decline and a 43.1% increase in total shipments between 1923 and 1935. It requires a considerable stock of material to enable American carbon black producers to care for the interests of customers near at hand, in the light of such variations. In the case of rubber, consumers have traditionally found it necessary to look out for themselves in the matter of maintaining supplies of a material coming from the opposite side of the earth. With restriction they find that their collective ability to maintain stocks is in final analysis limited by the rate of permissible exports announced periodically by the international committee.

It is impossible to escape the conclusion, therefore, that *the international effect of decisions of the committee regarding this essential commodity gives rise to international responsibilities to consumers as well as to producers of rubber.* A reduction of world stocks that would endanger the servicing of consumers with adequate supplies at reasonable prices would be unfortunate. If stocks were re-

duced to such a point that committee announcements on permissible exports had to be made monthly, instead of quarterly, the market might be constantly unsettled, and producers might find it more difficult to plan operations.

Even when world stocks of rubber are large in terms of months' supply, perhaps in excess of what unofficial opinion (producers) might regard as "normal," *such stocks may be so largely in the hands of a few manufacturers or held by middlemen against definite forward delivery contracts that there would remain relatively little free spot rubber.* The lack of equal pro rata distribution of stocks among manufacturers disturbs normal competitive conditions existing between manufacturers. *All* manufacturers, unfortunately, are not equally able to finance along supplies of crude rubber in inventory; the inability of some companies to maintain large inventories becomes more of a handicap to them under conditions of rising prices with controlled production than under free market conditions.

Stocks have now reached a point where each decision may have far more serious effects than previously. Stocks could be reduced to a really dangerous point, considering the time required for replenishment, before material price reaction would give notice of the situation. There may be interests which would not be averse to such a development, but it would decidedly not be in the true interests of industry welfare.

Nearby stocks of rubber have, at the date (June 30) of this article, already reached a point in terms of months' supply, which is lower than average year-end free stocks of carbon black (excluding years when such stocks were excessive), but including stocks other than producers. Stocks within restriction areas and stocks afloat have now been reduced to currently low production levels, lower than the consumption rate, leaving a vacuum there to be filled. Except in the United States and the United Kingdom, no cushion stock to take care of fluctuations and emergencies is known to exist. Those stocks are not well distributed as to ownership. *World stocks can now be increased only through a reduced rate of demand or through announcement at a regular or special committee meeting of an increase in the rate of permissible exports, followed by increased production, increased stocks in restriction areas, increased stocks afloat, and, finally, increased stocks in consuming markets. Such operations require considerable time to become effective, and any initial delay in action that might become necessary could only have disturbing results.* Nevertheless experience would indicate that some producer-dealer interests in England are not slow in criticising decisions of the committee not to their liking. *If the committee is fully informed and not lacking in firmness, it should not find the situation difficult to control.*

Those who hope that the rubber regulation scheme will establish the desirability of human control over widespread industrial matters will wish the committee every success in its endeavors. Those who doubt the possibility of reasonable economic balance through regulation by supreme councils will be alert for errors to criticise. Those trade elements whose prosperity is directly involved in one way or another all have to speculate on what course the committee may take. An impartial observer might sympathize with the committee, faced with the responsibility of charting a course through these shoals, and with the rubber trading industries for their necessary speculation on committee decisions.

The present international committee labors under the handicap of a certain lack of confidence on the part of consumers because the committee in charge of the Stevenson scheme allowed prices to get out of control. *If mutual confidence and equilibrium are maintained, it will probably be the result of the closest cooperation between fully informed individuals on the committee and in the trade, plus a determined policy of moderation on the part of committee sponsors.*

Protective Coating

(*Continued from page* 43)

TABLE 1

COMPANY	CABLE TYPE	HIGH VOLTAGE TEST FOR DIELECTRIC STRENGTH
Packard	Standard	Start at 1 kv. and increase 1 kv. per minute. Minimum 40 kv.
Packard	Standard	Start at 10 kv. and increase 10 kv. each 30 minutes. Minimum 30 kv.
General Cable Co.	Types Cu-Fe #250, #137, and Thermotype #175	Start at 20 kv. and increase 1 kv. per minute. Minimum 32 kv. or
General Cable Co.		Start at 20 kv. and increase 1 kv. per minute. Minimum 25 kv.
Belden	Standard	Start at 20 kv. and increase 1 kv. per minute. Minimum 32 kv.
Okonite	New type Super-duty	Start 20 kv. for 5 minutes then 1 kv. per minute. Minimum 35 kv.
Okonite	Thiokrene	Start 15 kv. for 5 minutes then 1 kv. per minute. Minimum 35 kv.

Another test of interest which the manufacturers specify for the insulation of automotive ignition cable is described as a life cycle test wherein the cable is wound upon a brass mandrel and placed within a brass sheath and a high voltage (15,000 volts) applied between the conductor and the sheath. Ozone forms readily, and the successful resistance of the protective coating is manifested by the absence of insulation breakdown. This test is conducted after successive periods of gas, oil, and water immersion and hot and cold temperature periods. The specified conditions of these tests vary slightly with the different companies, but it must be said in justification that the procedure is adopted by all groups as a rapid method of predicting the behavior of the insulation in its intended application to automotive engines. When the insulation requirements of other cables is considered, the performance of automotive ignition cable is unique.

International Trade in Rubber Footwear Near All-Time Peak in 1935

Exports of all types of rubber boots and shoes by principal rubber manufacturing countries were estimated at 72,246,000 pairs in 1935, 10.5% above the figure of 65,403,000 pairs in 1934, but 9.5% under the 79,805,000 pairs in the all-time high year of 1933.

An enumeration of the countries participating in world export markets for rubber footwear in 1935, with the number of pairs shipped and percentage of total each obtained, follows:

ESTIMATED INTERNATIONAL RUBBER FOOTWEAR TRADE IN 1935
[Prepared by the Leather and Rubber Division]

Country	Thousands of Pairs	Percentage of Total
Austria	367	0.5
Belgium	20	0.0
British Malaya	710	1.0
Canada	4,731	6.5
Czechoslovakia	4,977	6.9
France	1,596	2.2
Germany	1,771	2.5
Hong Kong	2,605	3.6
Japan	51,015	70.6
Sweden	883	1.2
United Kingdom	1,298	1.8
United States	983	1.4
U. S. S. R. (Soviet Russia)	1,290	1.8
Total	72,246	100.0

The Adequacy of the International Rubber Regulating Agreement[1]

A Summary With Some Concluding Observations

F. Howard Croninger, Jr.

IT MUST be remembered that every industry has problems peculiar to itself and is affected in a different manner by particular aspects of production, consumption, and distribution. Furthermore in considering possible alternative restriction schemes, each of several schemes might face quite different problems, even if applied in the same industry. Failure or success of past plans in another or even in the same industry must not be considered too indicative of the worth of or the prospect for present controls. No set of standards can be set up which will apply to all industries. Consider, for example, the present rubber and tin control schemes.[2] The tin not mined remains; while the rubber not tapped is lost, except as the condition of the tree may be improved; tin does not require much tending; while rubber trees must be tended; tin has few satisfactory substitutes; while rubber has more; and tin can utilize unskilled labor; whereas rubber tapping is a skilled occupation. At the same time there are similarities between the tin and the rubber production industries such as concentrated production in southeast Asia and major consumption outside the productivity areas.

Another factor is that rubber is a comparatively young industry, rising from very negligible proportions at the turn of the century to become one of our leading imports since the war period, and this principally because of the growth of the automobile industry.

In summary of the economic considerations which have faced and are facing the rubber producing industry, I list the following seven:

(1) Approximately 98% of the rubber production of the world is concentrated into a comparatively small area of southeastern Asia.

(2) Rubber is primarily consumed in territories other than where it is produced; the principal consumer is Uncle Sam. This distinct division of production and consumption leads to sharply conflicting differences of motives and opinions. The primary interest of producers is for higher prices; that of consumers is for lower prices, and there is little of mixed interests.

(3) There is a comparatively inelastic demand for rubber. The automobile industry is the primary consumer, and rubber forms only a small portion of the total cost. Thus changes in the prices of rubber have little influence on total consumption unless the upward swings in price are very great. At the same time rubber prices are extremely important to all rubber manufacturers and to the tire buying public. Each added cent per pound on rubber imports means $10,000,000 a year to importers, and undoubtedly means something more to ultimate consumers.

(4) This inelastic demand is combined with a peculiar supply situation: i.e., rubber trees are very easy to plant and grow, but require from five to seven years to come into bearing. Thus plantings now take care of demand some years in the future, and since major plantings have always, in the past, taken place during periods of high prices and have come into bearing age during periods of depression, there has been alternate over and under rubber production.

(5) Then there are two quite distinct methods of production. First is the estate producer who depends upon a higher yield per tree, a longer lived tree, improved methods of cultivation and tapping, scientific research, et al, in other words, depends on intensive cultivation for his competitive advantage. Second is the native who depends upon a smaller yield from enough more trees per acre to have a total yield per acre larger than the estates. That is, he depends upon extensive cultivation in the abundant land of Sumatra and Dutch East Indies, and other islands, (with practically no overhead costs), and upon his ability to underlive his competitors, to enable him to compete successfully. Only a complete survey of the economic conditions prevailing among the natives at a particular time will enable one to make estimations concerning native production. The intensive survey now being undertaken by the Netherland India Government is very important in that it should at least give fairly accurate knowledge concerning the native—an almost unknown quantity.

(6) The situation is further aggravated by poor centralization, financial or otherwise. There are a few large and many small producing companies in the area which for the most part have followed entirely individual and separate courses of action.

As long ago as 1932 the then chief secretary of the Federated Malay States Government made a plea for centralization of the many associations representing the interest of rubber growers in Malaya, saying, "It would help the Government very much if some organization were in a position to say to it, 'We have taken the opinion of our members upon the following point; and votes representing so many hundred thousand acres are in favor

[1] Concluded from India Rubber World, Dec. 1, 1936, pp. 41-42.
[2] See J. K. Chisholm, *Harvard Business Review*, V, XIII, pp. 475-82 (Summer, 1935).

of it, and votes representing so many hundred thousand are against it.' "[3]

This situation has been partially corrected by the formation on January 1, 1935, of the United Planting Association of Malaya which now has a quasi-official status, although it is not yet in a position to express a united opinion.

(7) Another consideration which must be kept in mind is that the present restriction scheme began operations in an acute depression.[4] It could hardly be called a depression phenomenon because, unless there had been a steady expansion of consumption, the industry would have faced serious difficulties anyhow. But the economics of restriction schemes vary with their economic environment. Restriction may be considered entirely consistent with *laissez faire* under certain depression situations when it would be entirely invalid under prosperity. For example, in a period of rapidly falling prices many estate producers are faced with bankruptcy. If they are forced to go through with the liquidation process, their stockholders lose heavily, and someone else can buy the estates for a song and begin production again with practically no overhead costs. In such a situation it could be considered fair to tide such producers through temporary emergencies.

Is it not to the advantage of low-cost producers to have the high cost-producer driven out? One reason why it is not to their advantage has been indicated directly above. Also, when immediately theatened with bankruptcy, many estates will produce at maximum capacity in their effort to realize something on their overhead and prime costs, thus aggravating the situation still further. They are aided in this by their ability drastically to reduce salaries, wages, and other expenses. If, however, restriction is introduced, with somewhat higher prices, readjustments may be tided over to a later period. With a gradual return of prosperity the high-cost estates will no longer be able drastically to reduce all costs because there will be other means of employment. In depression areas governments further favor restriction schemes to resuscitate the financial condition of their colonies.

It is further arguable that very low prices for a considerable period of time may so depress and demoralize the industry that returning prosperity may find an inadequate supply available; and thus begins again the process of over-compensation.

As a cure for a permanent decline in consumption of a long continuing state of surplus production, restriction cannot be considered sound. As mitigating a period of temporary decline in consumption or temporary surplus production, restriction may have its place. Very seldom, however, have the operators of such schemes been satisfied with merely tiding themselves through temporary financial difficulties. Had the British cut off their Stevenson plan in 1924 when consumption and prices had recovered from the low level of 1921-22, the plan might have been considered sound. But unfortunately, it went on to an inglorious end in 1928.

In view of the above considerations I think that it can be said that rubber has been suffering from a temporary relapse in consumption and from a cyclical period of overproduction. It seems, furthermore, that consumption can hardly be expected to increase at the rapid rate it did in the two decades immediately preceding 1930 and, in addition, that the existing production capacity is sufficient to take care of the world's needs for some time to come. At the same time this situation of overproduction is not one of necessary permanence or beyond control. I conclude, then, in view of all that I have been saying, that the present rubber restriction program is sound as a short-run measure to facilitate a more orderly adjustment of supply to demand. However a major danger lies in the fact that the operation of the agreement is being closely watched by planters, governments, and other directly interested persons, with an eye to its future—with the present period being regarded as important largely for trial purposes. For example, in addressing the annual meeting of the Rubber Growers' Association, London, on Thursday, April 23, 1936, Robert Stewart, chairman, declared:

"All things considered it is clear that the future of our industry is bound up with international regulation of rubber supplies. We must, I suggest, regard the present scheme as preliminary to a continuing period and I think I am correct in saying that the weight of opinion at present is certainly in favor of a continuation of the scheme beyond the period already provided for."[5]

I cannot believe that as a long-run cure for the estate-native problem, for the regularizing of supply, or for the best interests of efficient producers, consumers, or governments, restriction is sound. Assuming a continued recovery of consumption and a price of 6 to 8 d. or above, I believe that the present restriction principle should be discontinued at the end of its present duration or even at an earlier date. Even though the committee were to continue to act with great discretion, its potential power would be a constant temptation to manipulation, a refuge in emergencies, real or fancied, to be substituted for improved efficiency.

If some form of continuation is demanded by the planters in 1938, I would favor the following: restricted regulation of new plantings, the maintenance of a reliable system of statistics and information, and increased financial and administrative centralization.

Some of the possible gains from the present rubber restriction program are:

(1) Improved financial condition of the estates, with a possible saving of investments and painful readjustments.

(2) Improved standard of living for the natives.

(3) Stabilized rubber prices through a gradual reduction of world stocks, which stabilization would bring about a general feeling of confidence in the rubber market by removing the fear of rapid unloading of stocks.

(4) Improved scientific research in the producing industry.

(5) Better statistical data and knowledge.

(6) Improvements in rubber quality and in production and marketing methods.

(7) Development of new products with superior qualities.

(8) Savings through increased use of reclaimed rubber.

Some of the possible costs of the present rubber restriction program are:

(1) Increased price to consumers.

(2) Maintenance of production *status quo* to the special benefit of high cost and obsolete plantations and to the particular disadvantage of the native.

(3) Higher costs of production because of restricted output.

(4) Cost of administration.

(*Continued on page* 55)

[3] Harrison Lewis, "Rubber Regulation and the Malayan Plantation Industry," U. S. Dept. of Commerce, Bureau of Foreign and Domestic Commerce," Trade Promotion Series No. 159, p. 23.

[4] E. G. Holt, assistant chief of the Leather and Rubber Division, Bureau of Foreign and Domestic Commerce, Washington, D. C., has pointed out to me that, "it appears that the present control, like the Stevenson Scheme, is operating in a period of recovery from depression rather than a period of depression." I think this is a significant and accurate statement; I would only point out that the potential overproduction facing the industry in 1934 was much greater and was more widespread than in 1922.

[5] *Bull. Rubber Growers' Assoc.*, April, 1936, p. 146.

Organic Accelerators

Important in the Development of Rubber Technology

E. A. Van Valkenburgh[1]

MUCH of the remarkable progress made by the rubber industry during the past thirty years is attributable to the development and systematic application of organic accelerators of vulcanization. Discoveries by Oenslager in 1906, these specialties were first developed to correct variability in the curing rate of crude rubber. It was soon found, however, that they produced vulcanizates with greatly improved physical properties. Accelerators, moreover, proved indispensable in those early days in making it possible for rubber to meet the requirements for pneumatic tires and inner tubes, which continually became more exacting with the growth of the automobile industry. Gradually they also were adopted for mechanical goods and for all other articles manufactured from rubber at that time. More recently, by rendering rubber suitable for a diversity of new applications, these organic bodies have introduced it as an engineering material into several additional fields of industry; and they have thus been in large measure directly responsible for the notable advancement of the rubber business during the past two decades.

Essential to Modern Compounding

Although the accelerator ratio in most technical mixtures is not more than 0.5 to 2.25% of the rubber present, these substances definitely constitute the foundation on which modern compounding practice has been built. Despite the fact that they are used in such low percentage, because of their universal adoption and the rapid expansion of the rubber industry, the annual consumption of these organic accelerators throughout the world has now grown to a volume of more than 5,000 tons, representing a value of nearly $4,000,000.

After Charles Goodyear's discovery of sulphur as a vulcanizing agent in 1839, it became traditional practice to compound rubber with a great variety of inorganic fillers. Basic lead carbonate was disclosed in his original patent, and it was soon evident that many other materials, as zinc oxide, lime, magnesia, and litharge, had an important effect upon the rate of vulcanization and the cured properties obtained. In view of the subsequent importance of amines and amino derivatives, it is of historical interest to note that the use of ammonia also was covered by an English patent as early as 1881, although in practice its effect upon rate of cure was not so strongly emphasized as its use as a blowing agent in sponge rubber.

Among the various grades of wild rubber available at that time many lots could be cured fairly rapidly and yielded satisfactory vulcanized properties when used in any standard formula. Other grades cured so slowly, however, that they could be employed in commercial compounds only when certain supplementary agents were added to correct deficiencies in the natural products. With the advent of plantation rubber at the end of the last century more systematic efforts were made to eliminate this variability. A little later, particularly in Germany, attempts to extend the use of synthetic rubber also stimulated research in this field.

Thus, in addition to the limited number of inorganic accelerators already in common use it eventually was found that many organic bases and their reaction products, when used in low percentage, positively accelerated the rate of cure, frequently cutting down the vulcanization interval to one-half or even one-third of the time previously required. Subsequently it developed that they also made possible the general adoption of reduced curing temperatures, thus minimizing the heat degradation of rubber, which always occurs during vulcanization. More important than this effect upon rate of cure, however, was the fact that these new organic accelerators brought about a positive, specific enhancement of cured quality for low-grade wild rubbers and the more uniform plantation types as well as for synthetic products. Moreover these optimum physical properties were developed with much lower sulphur ratios, and these in turn were reflected in remarkably improved resistance to aging.

Finally, about fifteen years ago, it was recognized that the variation in rate of cure for plantation rubber was largely due to differences in the percentage of stearic, oleic, and linoleic acids present. From the discovery came the realization that most organic accelerators are much more effective when used in conjunction with the rubber soluble fatty acid soaps of zinc, lead, cadmium, or certain other metals. The efficient, general use of these accelerators really dates from about 1920, when it became well known that such soluble soap "activators," if not absolutely essential, at least are extremely helpful in most cases.

Far from being accidental the discovery of organic accelerators was the result of the patient, methodical investigation of a wide range of different substances. Among the early commercial accelerators were oils as well as low melting solids. Many of them were toxic, imparted an undesirable odor to the cured rubber, or caused serious trouble with discoloration. More recent development work has emphasized the importance of using non-volatile solids and liquids which do not change under ordinary storage conditions. There is also a preference for powders, which can be weighed and handled conveniently in the compound room, and for materials which are soluble or which can readily be dispersed in rubber.

First Commercial Accelerator

As regards historical background, aniline was the first organic accelerator adopted commerically in Akron in 1906. Several years later, in 1913, the Hofmann-Gottlob patent in Germany disclosed piperidinium pentamethylene dithiocarbamate. These two materials epitomize the doz-

[1] With Foster D. Snell, Inc., 305 Washington St., Brooklyn, N. Y.

ens of organic chemicals commercially employed to date as rubber accelerators. The chemical history of the industry discloses a progressive development from the mild free organic bases through the aldehydamines and guanidines to the more active sulphur-bearing accelerators. Of this latter group mercaptobenzothiazole has continually grown more popular during the past fifteen years. The current extensive utilization of liquid latex frequently requiring vulcanization at ordinary temperatures, necessitates the use of the most powerful ultra-accelerators, as Hofmann and Gottlob's "Pip-pip."

At first it was usual to employ but one organic accelerator in a technical rubber compound, but now two or even three of these specialties are often used at the same time. In its inception the tendency to adopt accelerator mixtures was concerned principally with the possibility of securing a faster rate of cure and a more complete vulcanization reaction. This led to the adoption of small percentages of the most active carbon disulphide derivatives as supplementary boosting agents for the milder accelerators then in common use. Frequently, however, these accelerator combinations not only increased the speed of reaction, but introduced as well processing difficulties in handling the raw rubber stocks prior to vulcanization.

Apart from considerations of rate of cure, it has long been known that the physical properties of a rubber compound can be modified by using different types of accelerators. For example, the stiffness or hardness of a stock changes appreciably with different accelerators. Besides the general characteristics of a well cured vulcanizate, certain accelerators make definite contributions with respect to essential physical properties, such as resistance to repeated flexing or to abrasion. Then general adoption of accelerator mixtures, carefully proportioned to ensure specific mechanical properties in a given commercial stock is unquestionably the most important improvement in rubber compounding of the past decade.

Progressive Development

From the standpoint of the organic chemist it is interesting to trace in some detail the progressive development from the first relatively simple chemicals used to the mixtures of complex substances employed for acceleration purposes today. While Oenslager's discovery of aniline as the first organic accelerator was an epoch-making achievement, it is not surprising that because of its low accelerating power this material was replaced in a few years by other more active amines. For example, paraphenylenediamine was soon found to be a much stronger accelerator than aniline, and paraaminodimethylaniline, as satisfactory as any of the free bases, was rather generally used for some time.

Nitroso Compounds

About 1910 nitroso compounds also were found to accelerate rubber vulcanization. The early study of amino derivatives led to the limited commercial use of paranitrosodimethylaniline. Later in Europe nitrosobenzene and nitrosophenol also were adopted to some extent. In general, however, trouble with toxicity and discoloration, as well as the increasing need of more powerful accelerators, gradually led to the substitution of aldehydeamines and carbon disulphide derivatives for these nitroso bodies and for the free amines.

Guanidines

During this transition period the substituted aryl guanidines were widely adopted. In fact they were perhaps the most extensively used organic accelerators from 1920 to 1930, until mercaptobenzothiazole and various combinations of the sulphur bearing ultra-accelerators came into prominence. Triphenylguanidine, because it gave less premature curing trouble during processing, became more popular for many applications than the diphenyl or diorthotolyl bodies. Nevertheless these two substances had become well established for small molded articles and are still employed extensively in such work today. As primary accelerators for general purposes, though, guanidines are being rapidly curtailed. They give considerable premature vulcanization trouble, discolor rather badly, cause low resistance to cracking, and are devoid of antioxidant properties. In spite of these objectionable features the guanidines are very effective as supplementary activating materials in accelerator mixtures. Used in low percentage they do not detract appreciably from the superior aging and other desirable characteristics obtained from the primary accelerators, and they usually contribute specific valuable properties in addition to positive acceleration of the rate of cure.

Aldehydeamines

The aldehydeamines are an important group of accelerators which first came into prominence nearly thirty years ago when hexamethylenetetramine was developed as a substitute for aniline. This substance commonly called "hexa," gave little scorch trouble, did not discolor, and was suitable both for mold and air curing. The fact that it often caused dermatitis, however, together with its mild activity, led to its gradual replacement during recent years, by more active aldehydeamines, frequently in combination with sulphur bearing substances.

Aldehydeammonia, the other original member of this group, was soon supplanted by acetaldehydeaniline, several modifications of which have been featured commercially. Depending upon the ratio of aldehyde and amine employed and upon the manner in which they are combined, there are many different possibilities in this class of condensation products. Generally speaking, formaldehyde functions well when combined with aliphatic amines, but poorly with aromatic amines. Acetaldehyde, butyraldehyde, and heptaldehyde, on the other hand, yield excellent accelerators when condensed either with aromatic or alipathic bases.

By 1925, after fifteen years of development work, the more powerful aldehydeamines had become a big factor in replacing the guanidines as primary accelerators. They usually facilitate the processing of raw rubber compounds, but their resistance to scorching varies from one member of the class to another. Being most effective at higher vulcanizing temperatures, they are more suitable for molded articles than for air cured goods. The more active members of this group, however, particularly the butyraldehyde and heptaldehyde condensation products are used in air cured goods in conjunction with carbon disulphide derivatives, the combination frequently being activated by a guanidine.

Newest Type of Accelerators

The latest notable commercial addition to this group is phenylaminomethylbenzothiazylsulphide, the reaction product of mercaptobenzothiazole with formaldehyde and aniline. As a result of much intensive experimental compounding in recent years, the sulphur-bearing substances, often listed as carbon disulphide derivatives, have become the most important category of organic accelerators. With regard to chronological development, important members of this group were thiocarbanilid, first adopted commer-

cially at Akron in 1907 as a less toxic, more powerful substitute for aniline; "Pip-pip" disclosed by a German patent in 1913, as mentioned previously; and mercaptobenzothiazole, announced in 1921 and generally accepted by the industry during the past fifteen years.

The complex sulphur compounds in this category logically fall into two classes: first, the thiocarbamate, thiuram sulphide, and xanthate types, which have essentially straight chain linkages between the aliphatic or aromatic substituent radicals; and second, the benzothiazoles, for which the typical five atom ring always constitutes the intermediate linkage. In general the so-called ultra and semi-ultra modern accelerators are furnished by this first class, while the benzothiazoles from the second are continually becoming more popular for all sorts of general compounding problems.

Several members of the first class are now being featured commercially as low critical temperature, high modulus accelerators. On account of their extreme activity, however, they usually are used as secondary or boosting agents in conjunction with mercaptobenzothiazole or other milder primary accelerators. As regards the development of these products, after the early adoption of thiocarbanilid, and the interest aroused by "Pip-pip" a few years later, some time elapsed before the aliphatic carbon disulphide addition products began to receive serious commercial consideration in 1918.

Boosters

In the early work with dimethylamine-dimethyldithiocarbamate it was found that this substance in the presence of zinc oxide was a much more powerful accelerator than any free base. This led to the development of zinc dimethyldithiocarbamate, one of the most powerful accelerators known, which is now being successfully employed in low percentage as a booster in practical rubber compounds. Zinc dithiobenzoate and zinc butylxanthate also have been thoroughly studied. But these salts cause so much scorch trouble that they have not been extensively used under industrial conditions.

Another material in this same ultra-accelerator category, less difficult to handle and rather widely adopted for special applications, is tetramethylthiuramdisulphide. Because of its delayed action effect the corresponding monosulphide is featured as a safer material from the processing standpoint. These two substances require somewhat higher curing temperatures, but ultimately yield vulcanizates similar to those given by the more active zinc salts. Finally, it is now recognized that various esters, particularly diphenylcarbamyldimethyldithiocarbamate, while producing the high modulus stocks typical of this general group of carbon disulphide derivatives, are especially free from scorch trouble.

In the second class of sulphur-bearing accelerators, in addition to the original mercaptobenzothiazole, a number of other thiazole derivatives have been promoted and are being adopted rather generally. Benzothiazyldisulphide, for example, is featured as an alternative material, giving less scorch tendency during proceeding, but producing low modulus vulcanizates of almost identical properties. Other important commercial products are benzothiazylthiobenzoate and the mercaptobenzothiazole condensation product with benzylchloride and hexamethylenetetramine. Zincbenzothiazylmercaptide has also proved very effective as a somewhat more active derivative.

Mercaptobenzothiazole itself, however, is still the most important member of this group, and it is more extensively used than any other commercial accelerator today. First considered as a general commercial possibility about fifteen years ago, this substance was soon found to have distinctive, very valuable properties. Unquestionably it was the prime factor in establishing the greatly improved modern practice throughout the rubber industry with respect to reduced sulphur ratios and lower curing temperatures. With our present broader theoretical background it is now understood that much of this remarkable accelerator efficiency is due to the great stability of mercaptobenzothiazole at vulcanizing temperatures even in the presence of an excess of sulphur. This product is also much less sensitive to overcure than previously known accelerators. It yields vulcanizates with excellent heat resistance and aging properties as well as superior resistance to abrasion and to repeated flexing. Mercaptobenzothiazole compounds, even when highly loaded, give comparatively low modulus values. When stiffer stocks are required they may be readily obtained by adding a low percentage of one or more activating accelerators. If the ratio has not been excessively reduced in these accelerator mixtures, the effect of the mercaptobenzothiazole usually still predominates as regards excellent aging and greater factor of safety with respect to overcure.

In the past few years no new class of these organic specialties has been discovered. Development work has been devoted rather to the more efficient application of the guanidines, aldehydeamines, and sulphur-bearing substances, which are already well-known. Much research has been done to determine the most effective accelerator combinations and to devise better methods of incorporation to insure uniform dispersion of these active agents. Superior procedures of processing have also been developed, which minimize premature vulcanization in the case of more powerful accelerator mixtures.

Conclusion

In retrospect, the most striking feature of the rapid commercialization of rubber accelerators is the fact that this development has been largely empirical. For many years the issue was confused by the use for test purposes of crude rubber which contained natural accelerators and organic acids. In experimental compounding, also, the incidental addition of such materials as zinc oxide or palm oil often had a profound effect upon the results given by an accelerator, although this was not apparent at the time.

During the progress of accelerator development several theories were advanced which led research along fruitful lines. These usually were in accord with the facts known at the time, but none of them was sufficiently comprehensive to cover all aspects of the complex transformation which occurs during the curing process. The early adoption of basic amino bodies, for example, seemed consistent with the familiar accelerating effect of inorganic basic substances, such as lime and magnesia. For a time it was assumed by some investigators that only nitrogen compounds could be effective accelerators. Later, when certain polysulphides were found to be extremely active, various theories as to the role of accelerators as sulphur carriers were advanced. Then the discovery that the zinc salts of these complex sulphur compounds were still more powerful was associated with the beneficial effect obtained from soluble metallic soaps. Yet no satisfactory hypothesis has been formulated as to the mechanism of vulcanization itself.

For many decades after Goodyear's notable discovery the vulcanization phenomenon was considered entirely a matter of the chemical combination of sulphur with rubber. Eventually it was learned that when sulphur combines with the rubber hydrocarbon in the absence of nat-

(*Continued on page* 55)

Synthetic Rubber

Joseph Rossman, Ph.D.

THE following abstracts of United States patents treating of synthetic rubber conclude the enlightening article we have been running.

107. Bunbury, 1,873,542, Aug. 23, 1932. To make thermoplastic materials polymerize unsaturated fatty oils by heating them, simultaneously pass a current of a non-oxidizing gas through the heated oils, and then heat the gas-treated oil in the presence of a salt of a fatty acid.

Example 1: 500 parts of linseed oil are heated at 290 to 300° C. for five hours, during which a slow stream of sulphur dioxide is passed through the oil. The vessel in which the heating is carried out is connected to a vacuum pump, and a vacuum of about 28 inches of mercury is maintained during the process. During the preliminary heating up of the oil the latter darkens slightly, but this change soon disappears, and the oil finally possesses a color lighter and clearer than that of the original. In starting the process a good vacuum is first obtained. The sulphur dioxide is then passed into the oil, and heating commenced so that at no period is the hot oil subjected to the action of air or oxygen. After the heating the oil is cooled to about 150° C. while still in the atmosphere of the gas. Below this temperature the oil may be exposed to the air without detriment. When cold, the product is a thick oil of much greater viscosity than the raw linseed oil started with. The final product is found to contain no absorbed gas, and the oil suffers little or no loss in weight as a result of the process. The iodine value of the oil falls from 180 to about 100 to 110, and the acid value is slightly increased.

If instead of heating for five hours, the oil is heated for three hours, the product is less viscous and has an idoine value of 125. If the process is continued for seven hours, a very viscous product is obtained having an iodine value of about 90 to 95. If lower temperatures are employed, the process must be continued for a correspondingly longer time to obtain the same degree of unsaturation, and the time may be curtailed by employing higher temperatures, e.g., 320 to 330° C. Although not absolutely essential, it is desirable that no oxygen be allowed to enter the apparatus until the process has been completed and the oil cooled to at least 150° C.

Example 2: linseed oil is treated in a manner similar to that described in Example 1 except that hydrogen sulphide is employed in place of sulphur dioxide. The product in this case is slightly darker in color than the original oil and contains no absorbed gas. It is much more viscous than the starting material, and the reduction in the degree of unsaturation is represented by a drop in the iodine value from 180 to 105 to 110.

108. Tschunkur and Bock, 1,906,667, May 2, 1933. A rubber-like vulcanizate comprises a mixture consisting of a butadiene hydrocarbon polymerization product and of at least 10% by weight of natural rubber, finely divided carbon in an amount equal to between about 20 to 70% by weight of the mixture, and a vulcanizing agent.

Example 1: three parts of sulphur, 15 parts of zinc oxide, two parts of tar, two parts of stearic acid, 50 parts of carbon black, and one part of diphenylguanidine are rolled into 100 parts of a mixed rubber-like mass containing 50 parts of artificial rubber, which mass has been obtained by polymerizing butadiene-1,3 by simple heating to 60 to 70° C. in the presence of natural rubber. The mixture is vulcanized at a temperature of about 130 to 140° C. in the usual manner. A high-grade elastic vulcanizate is thus obtained, possessing a tensile strength of 220 to 250 kg/sqcm at a stretch of 700 to 750% and an elasticity of 48 to 50%.

Example 2: 65 parts of a rubber-like polymerizate obtained by polymerizing butadiene in the presence of sodium metal are mixed by rolling or kneading with 35 parts of natural rubber, 70 parts of carbon black, one part of sulphur, five parts of zinc oxide, four parts of tar, two parts of stearic acid, and 1.8 parts of a 50 to 60% alcoholic solution of the decahydroquinaldine salt of the dithiocarbamate derived from decahydroquinaldine; and the mixture is vulcanized at 143° C. for 50 to 60 minutes. The vulcanizates thus obtainable possess a tensile strength of about 200 to 220 kg/sqcm at a stretch of about 600 to 700%. The above mixture is especially valuable for manufacturing high-grade tires.

109. de Waele, 1,910,005, May 23, 1933. Coherent elastic masses resembling rubber comprise cold vulcanized acetylated castor oil.

110. Ellis, 1,927,929, Sept. 26, 1933. A composition comprises a sulphurized ethylene plastic and a non-volatile resinous substance containing combined sulphur readily miscible therewith, such materials being well mixed.

111. Ellis, 1,927,930, Sept. 26, 1933. A plastic comprises methylene sulphide and more than its weight of a sulphur resin as a modifying agent blended therewith.

112. Fuji and Fukuda, 1,938,015, Dec. 5, 1933. A viscous rubber-like product results from the reaction of 5 to 10% of lead carbonate on a vegetable oil, which product, on exposure to air, congeals, is flexible, transparent, and insoluble in water, fatty acids, or dilute mineral salts.

113. Auer, 1,957,437, May 8, 1934. The process comprises mixing a fatty oil with a substantially water-free alkaline modifying agent of the class consisting of alkali metals, alkali metal oxides, and alkali metal hydroxide, heating the mixture to between 200 and 300° C., and continuing the heating at these temperatures until, upon cooling, a solidified product results.

Example: 300 parts of rape oil are heated under vacuum to above 250° C. for two to five hours with 15 parts of solid potassium hydroxide. The product, on cooling, forms a plastic mass, which on heating with 30 parts of sulphur, six parts of zinc oxide, and 1½ parts of triphenylguanidine to 140° C. gives a vulcanized product which may be used as a rubber substitute.

114. Auer and Susztek, 1,963,065, June 19, 1934. In manufacturing thickened heat-bodied oil products from linseed oil, the process comprises mixing linseed oil with an alkali soap of the fatty acids of linseed oil, heating the mixture at a temperature sufficient to thicken and heat-body the mixture, the temperature being at least 200° C., until the thickened heat-bodied oil product is

produced, adding a vulcanizing agent to the oil, heating to a temperature and for a time sufficient to effect vulcanization, and recovering the vulcanized thickened heat-bodied oil products thus obtained.

115. Berdolt, 1,969,701, Aug. 7, 1934. To make a rubber substitute boil sulphur with water until it darkens in color, thereafter boil the boiled sulphur with linseed oil until an elastic sponge-like mass is produced.

116. Krauch and Mueller-Cunradi, 1,979,946, Nov. 6, 1934. A mixture of 100 parts of a plastic product obtainable by polymerization of butadiene with the aid of sodium, 40 parts of carbon black, five parts of zinc oxide, five parts of mineral rubber, two parts of wool grease, three parts of sulphur, one part of aldol-alpha-naphthylamine, and 0.6 part of mercaptobenzothiazole is prepared by intimately mixing the initial materials between rollers. The carcass of an automobile tire prepared in the ordinary way is covered with the mixture and vulcanized as usual.

117. Auer, 1,980,366, Nov. 13, 1934. To manufacture solidified oil products from linseed oil mix about 100 parts of the oil with about five parts of magnesium peroxide, heat the mixture to between 250 and 300° C. under vacuum, until the peroxide is dispersed in the oil, and, upon cooling, a hard solid modified product results.

118. Rohm and Bauer, 1,982,831, Dec. 4, 1934. This patent covers an insulated electrical conductor in which the insulating medium comprises one of the group consisting of a polymerized acrylic acid and a polymerized ester of acrylic acid.

119. Beyer, 1,983,731, Dec. 11, 1934. The method of making caoutchouc-like material comprises introducing starch and aluminum palmitate into an aqueous solution of zinc chloride and agitating the resulting mixture maintained at room temperatures until it forms a mucilaginous mass, treating the mass with benzol, permitting the mass to remain quiescent for such length of time as is necessary to obtain a substantial yield of caoutchouc-like material, and then coagulating the caoutchouc-like material by treatment with an aqueous solution of formic acid.

120. Beyer, 1,983,732, Dec. 11, 1934. The method of converting starch to a caoutchouc-like material comprises subjecting the starch to a vacuum, thoroughly impregnating the starch, while maintained under the vacuum, with formaldehyde, and subjecting the resulting mass to moderate heat under pressure in the presence of a catalyst selected from the group consisting of magnesium and nickel.

121. Auer, 1,985,230, Dec. 25, 1934. To manufacture modified bodies from fatty oils add an alkali metal to a substantially anhydrous alcohol to produce an alcohol solution of an alkali metal alcoholate, mix this solution with a fatty oil, distill away the alcohol from the mixture, and recover the modified body thus produced.

122. Auer, 1,985,231, Dec. 25, 1934. To manufacture vulcanized, non-oxidized, heat-bodied oil products from fatty oils heat a fatty oil under non-oxidizing conditions to temperatures sufficient to thicken and heat-body the oil until a non-oxidized, heat-bodied oil product is obtained; then mix the oil product so obtained with sulphur and vulcanize the mixture.

123. Auer, 2,007,958, July 16, 1935. A process of making rubber-like materials, chemically different from, but physically similar to rubber, comprises emulsifying in an aqueous solution a thickened heat-bodied fatty oil product of controlled body and containing an electrolyte dispersed therein; next, while maintaining the suspended particles of the oil product in the emulsified state, vulcanizing the particles so emulsified; then removing the water from the emulsion to recover a rubber-like material.

International Rubber Agreement

(*Continued from page* 50)

(5) The danger of manipulation for the immediate benefit of producers, and the neglect of long-run considerations: i.e., misuse by the International Rubber Regulation Committee of its large powers.

(6) Readjustments within the industry; for example, increased production of dry rubber on Dutch native holdings with consequent loss to remillers in Singapore and Penang.

(7) Altered proportionate supplies of particular grades of rubber, causing inconvenience and expense to some consumers.

It is too early to weigh these factors accurately. Thus far the advantages probably outweigh the disadvantages. But it must be kept in mind that the price has advanced well over 100% since the beginning of negotiations; that stocks have been steadily reduced; and that other schemes which became extortionate—schemes such as the Stevenson plan and the present tin control plan—operated in moderation for about two years. Personally I am inclined to be optimistic and have confidence in the International Rubber Regulation Committee and in the possible defenses of the consumer.

Barring unforeseen developments, there will be considerable agitation by producers, and possibly by governments for the renewal in 1938 of the inter-governmental treaty relating to rubber regulation. I have already indicated my belief that the continuation of the restriction principle, except in greatly modified form, will be quite undesirable.

Organic Accelerators

(*Continued from page* 53)

ural or added accelerators, very little physical vulcanization results. More recently it also became evident that the percentage of sulphur required for satisfactory curing varies with the type of acceleration employed.

Moreover with recognition of the fact that rubber is a polyphase system and with increased knowledge of the colloidal aspects of the changes involved, more attention has been given to the physical nature of commercial vulcanization. We now realize that both non-sulphur and sulphur reactions involve physical as well as chemical changes and that all these effects are intensified by accelerators. During the early stages of vulcanization, accelerators facilitate the combination of sulphur and rubber, presumably by activating the sulphur and also by breaking up the rubber into more active colloidal units. Indications are that this chemically vulcanized rubber, the physical properties of which have been modified only slightly, is subsequently disaggregated by the accelerator, with the formation of a large number of active units. These, in turn, under the influence of some gelling agent, as a soluble zinc soap, then combine to build up a more stable vulcanized structure, which has the many desirable properties of the cured rubber of commerce.

Against this broader theoretical background, accelerator research has now been placed on a more scientific basis. There is a clearly definite understanding as to the specific function of these organic specialties, and this should facilitate further progress in this field where so much already has been achieved. It is probable also that the general current interest in synthetic rubber will stimulate more intensive accelerator research.

Editorials

May 1937 Bring Further Happiness

NO OTHER phase of the substantial improvement of the rubber industry during the year just closed is of importance equaling that of again affording more employment for greater numbers of people. Because of diligent management, in spite of an overflowing measure of discouraging conditions during the lean and early recovery years, the rubber industry has kept its facilities in readiness to respond quickly to improved economic circumstances. During the year just closed that response has been most gratifying and has enabled the rubber industry to contribute its full share to that spirited atmosphere of thankfulness and joy that marked the holiday season to an extent unknown in recent years.

To the rubber and other industrial leaders, to those persons charged with creative responsibilities, to that vast group of men and women constituting the important working force, and last, but by no means least, to that still too large a group of industrially unemployed the publishers and staff members of INDIA RUBBER WORLD heartily wish an ever-increasingly full measure of security, happiness, and prosperity throughout this, the New Year.

The Rubber Industry Should Give

THE voluntary financial contributions of rubber companies are needed and justifiably expected along with those now being received from other industries to defray the $200,000 expense being incurred this year by the American Chemical Society in producing the "1937-38 Third Decennial Index to Chemical Abstracts."

Since the beginning of the American Chemical Society approximately 60 years ago, and very largely as a result of its correlating influence, chemical accomplishment in this country has grown to a position of importance second to no other in the world. What is true of chemical accomplishment is true also, and for much the same reason, of the relative position of the industries of the United States.

Indeed there are few alert industrial leaders today who do not bid for public recognition of the progressiveness of their respective institutions and resulting products by proudly and earnestly extolling the extent and merits of their research departments and the scientific accomplishments thereof. These same industrial leaders freely provide liberal budgets for the constantly growing facilities and personnel requirements for the expanding technical investigations. They have long realized the expense of maintaining active participation in the A. C. S. divisional activities to be an attractive investment in directional influence, progress, prestige, and inspiration. Because of this type of appreciation on the part of business leaders in general the divisional activities have grown in extent and in value. Constantly increasing contributions to the important literature on every scientific subject have been made with the passing of years. As a result libraries have come to be regarded as an indispensable part of the facilities of every industrial technical department.

Unfortunately it is not so generally realized by these leaders that the periodic classification and indexing of the vast and growing wealth of reference literature bears a very direct relation to the effectiveness with which the entire technical budget is expended.

Providing adequate finances for such a systematic undertaking, therefore, is their definite responsibility in the conduct of sound business planning.

There is evidence that this responsibility is not realized and accepted so fully by the rubber industry as by others. That the rubber industry is importantly a chemical one, however, is evidenced by the growth, support, and valuable spirited work of the Rubber Division, A. C. S. The nominal income of this activity is currently consumed in the perpetuation of its endeavors, not in the periodic classification and indexing of all past reference literature. Rubber executives cannot afford to evade the financial support of this valuable work.

The object of this editorial is not to present a proposal for the "Third Decennial Index," but rather to impress the leaders of the rubber industry with a realization of their responsibility in this regard. It is urged that all rubber technicians, whether members of A. C. S. or not, request immediately a free copy of the Decennial Proposal from Charles L. Parsons, secretary, A. C. S., Mills Building, Washington, D. C.; familiarize their respective executives with its provisions; and suggest an immediate tax exempt contribution, or the use of their influence to this end in a concerted fashion through the R. M. A.

Moderation Insurance

THE recent rubber price trend seems to indicate the existence of a belief that a rubber shortage will occur before producers can prepare to ship the required and now permissible quantities. That this situation could better have been safeguarded by suitable and timely action is proved by the deductions of our Department of Commerce as set forth in a report prepared last June, but not published until December. (See "World Stocks of Rubber," page 44.) This prompts the logic of having American manufacturers' representatives in the membership of the International Rubber Regulation Committee. At least available data would then be regarded equally from the producers' and manufacturers' points of view.

What the Rubber Chemists Are Doing

A. C. S. Rubber Division Meetings

Los Angeles Group

THE Los Angeles Group, Rubber Division, A. C. S., held its December 1 meeting at the University Club, Los Angeles, Calif. A very enjoyable dinner was served to 63 members and guests. New officers elected for 1937 are: T. Kirk Hill, of Kirkhill Rubber Co., chairman; Arthur Wolff, of New Jersey Zinc Sales Co., vice chairman; Carl Stentz, of E. M. Smith Co., secretary-treasurer.

L. A. Group Golf Trophy Donated by Binney & Smith

The program for the evening consisted of two very enjoyable talks. L. E. Wood, of California Institute of Technology, gave an instructive paper regarding exploration of the stratosphere by unpiloted rubber balloons carrying recording instruments and a small radio set which automatically broadcasts at frequent intervals information regarding conditions recorded by the instruments. The rubber balloon, replacing paper and other types, has very definitely aided stratospheric research because, particularly, its elasticity permits flexibility in expansion as external pressure becomes less at higher altitudes.

Judge Leroy Dawson, of the Los Angeles Municipal Court, narrated a great many of his experiences in a humorous manner to register a point of human interest in each story. It was also announced that the University of Southern California will offer a course on Rubber Technology to be given by R. B. Stringfield on the evening schedule.

The group Golf Trophy was presented to James Stull, of Santa Fe Rubber Mills, and is to be held by him permanently for winning the play-off tournament of former winners. A new trophy, as illustrated, was presented to the group for future contests by Binney & Smith Co. through Montel Montgomery, representative of Martin, Hoyte & Milne Co.

T. Kirk Hill

Arthur Wolff

Other door and table prizes were donated by: Charles Kipple, of the San Francisco Sulphur Co.; Bob Abbott, of C. P. Hall Co.; and Montel Montgomery, representing Binney & Smith Co.

Chicago Group

THE Chicago Group, Rubber Division, A. C. S., held its fifth annual Christmas Program at the Sherman Hotel, December 18. Dinner was served in the New College Inn, where members also enjoyed an unusual floor show. The group later adjourned to the Crystal Room where the program continued.

Roy Knipschild, director of research, Rosenow Co., was introduced by Leon J. D. Healy, acting chairman for the evening. Mr. Knipschild's subject was "Some New Aspects of Color in Modern Merchandising Methods." He was accompanied by his art director with a complete display of three-color printing. Mr. Knipschild demonstrated the possibilities to be derived from advertising in natural color. Art Director Voightman, then described the "one-shot" camera, which takes three pictures with one exposure, separating the colors with filters, so that the red, yellow, and blue plates for printing can be made from instant exposures.

Carl Stentz

After the paper of the evening, distribution was made to the group members of 74 prizes, donated by the following companies: Adamson Machine Co., L. Albert & Son, American Zinc Sales Co., Binney & Smith Co., Godfrey L. Cabot, Inc., Carter Bell Mfg. Co., Cleveland Liner & Mfg. Co., E. I. du Pont de Nemours & Co., Inc., General Atlas Carbon Co., Herron & Mey-

er, Midwest Rubber Reclaiming Co., Monsanto Chemical Co., New Jersey Zinc Sales Co., H. Muehlstein & Co., Inc., Naugatuck Chemical, Philadelphia Rubber Works Co., A. Schulman, Inc., Thiokol Corp., United Carbon Co., R. T. Vanderbilt Co., Wishnick-Tumpeer, Inc.

Group members were also informed that meetings for January, February, and March, 1937, were arranged for.

The Chicago Group will be pleased to place on its mailing list the names of all who wish to receive notices of future meetings; such names should be sent to the secretary, Ben W. Lewis, in care of Wishnick-Tumpeer, Inc., 365 E. Illinois St., Chicago, Ill.

New York Group

THE annual Christmas party of the New York Group, Rubber Division, A. C. S., was held at the Building Trades Employers Association clubrooms, 2 Park Ave., New York, N. Y., at 6:30 p.m., December 18. A record-breaking crowd of 463 members and guests was present for the turkey dinner and entertainment that followed.

Jack Whitehead, of the Seamless Rubber Co., New Haven, Conn., sang for the gathering and played his own accompaniment on the accordion.

A short business meeting was held in which the following officers for 1937 were unanimously elected: chairman, J. Miscall, Flintkote Corp., East Rutherford, N. J.; vice chairman, C. A. Bartle, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.; secretary-treasurer, D. C. McRoberts, INDIA RUBBER WORLD, New York; sergeant-at-arms, David Scott, Jr., Henry L. Scott Co., Providence, R. I.; executive committee, R. D. Gartrell, United States Rubber Products, Inc., Passaic, N. J.; E. B. Curtis, R. T. Vanderbilt Co., New York; C. R. Haynes, Binney & Smith Co., New York; E. W. Schwartz, General Electric Mfg. Co., Bridgeport, Conn.; F. S. Malm, Bell Telephone Laboratories, Inc., New York; J. D. Van Etten, Vansul, Inc., New York; A. H. Nielson, Lee Tire & Rubber Co., Conshohocken, Pa.; K. J. Soule, Manhattan Rubber Mfg. Div., Raybestos-Manhattan, Inc., Passaic.

W. P. Voth, Akron Standard Mold Co., Akron, O., gave a very interesting talk illustrated by motion pictures on "Modern Methods of Curing Rubber Articles." He presented the high-pressure hydraulic press, the low-pressure oil press, and the electrically driven press. He stressed the advantages of bolting the mold parts to the press; employing automatic knock-out devices to remove the cured article; utilizing timers to open and close the press and to turn on and shut off steam or cooling water.

Walter Grote, United Carbon Co., Charleston, W. Va., demonstrated the very difficult art of catching fish from the air in the absence of water. Harry J. Day, Bell Telephone Laboratories, expert in ultra-speed photography exhibited some of his machines and by moving pictures showed how high-speed pictures of a fast moving mechanical part can be projected slowly to show defects in design and thus render very valuable service in the development of high-speed machinery.

The following donors of merchandise or cash provided a great variety of useful and valuable gifts, some of which were distributed to all as favors; while the remainder were given to the holders of lucky tickets: Ansbacher-Siegle Corp., Akron Standard Mold Co., Anaconda Sales Co., Baker Perkins Co., Binney & Smith Co., Calloway Mills, Inc., Godfrey L. Cabot, Inc., Carter Bell Mfg. Co., E. I. du Pont de Nemours & Co., Inc., Essex Rubber Co., Flintkote Corp., General Atlas Carbon Co., Givaudan-Delawanna, Inc., J. M. Huber, Inc., Ideal Novelty & Toy Co., Imperial Paper & Color Corp., INDIA RUBBER WORLD, Lea Fabrics, Inc., Monsanto Chemical Co., H. Muehlstein & Co., Inc., National Rubber Machinery Co., National Sherardizing & Machine Co., Naugatuck Chemical Division of U. S. Rubber Products, Inc., New Jersey Zinc Sales Co., Paracord Co., Pequanoc Rubber Co., Rare Metal Products Co., *The Rubber Age*, A. Schrader's Son, Henry L. Scott Co., Southwark Mfg. Co., St. Joseph Lead Co., Stamford Rubber Supply Co., C. J. Tagliabue Mfg. Co., Titanium Pigment Corp., U. S. Rubber Reclaiming Co., R. T. Vanderbilt Co., Vulcan Proofing Co., and Wishnick-Tumpeer, Inc.

Akron Group

THE Akron Group, Rubber Division, A. C. S., will meet January 15, 1937, at the Akron City Club, Akron, O. H. T. Youngren, chief engineer, Oldsmobile Division, General Motors Corp., will speak on "Some Highlights on Automotive Engineering."

A. C. S. Election

FRANK C. WHITMORE, dean of the School of Chemistry and Physics of Pennsylvania State College, has been elected president of the American Chemical Society for 1938, according to an announcement on December 17 by Dr. Charles L. Parsons, secretary of the society.

Dr. Edward R. Weidlein, director of the Mellon Institute of Industrial Research, Pittsburgh, president-elect for the past year, took office January 1, succeeding Professor Edward Bartow, of the State University of Iowa.

Mr. Whitmore is the author of many treatises on scientific subjects and has just completed a text on organic chemistry, said to be the first work of its kind. The William H. Nichols Medal of the New York Section, A. C. S., recently was awarded to him.

Three directors elected were Townes R. Leigh, acting vice president of the University of Florida; Robert E. Swain, of Leland Stanford University, and Dr. Willard H. Dow, president of the Dow Chemical Co., Midland, Mich.

Rhode Island Rubber Club

MORE than 120 members and guests of the Rhode Island Rubber Club participated in the annual bowling competition at the Washington Alleys, Providence, R. I., from 4:30 to 6:30 p. m., December 11. Dinner was then served at the Narragansett Hotel, and this was followed by an interesting and instructive program which consisted of a paper, "Recent Developments in Latex Technology," by Dr. Royce J. Noble; and "The Use of Scientific Methods in the Detection of Crime," by Dr. Lester Round.

Dr. Noble, well-known latex consultant and author of "Latex in Industry," emphasized the extent of latex development work during the past 1½ years. Besides indicating the effort being made in the Far East to improve uniformity and cleanliness, the speaker enumerated the recent important and expanding activities in connection with the production of textiles, paper, thread, dipped and molded goods.

He said in part, "Among the methods being most actively developed at the moment is the Kaysam process, the essential features of which comprise the use of a heat sensitive latex, pouring the compound into an aluminum mold, and jelling. . . . "

Dr. Noble's observation as to price is also of interest: "One disadvantage in the use of latex in recent years has been a price differential of 2 to 3 cents per pound solids over sheets. With the low price of rubber this difficulty has been a serious handicap, at least in some applications. As the price of rubber continues to advance this differential becomes an increasingly smaller factor."

Dr. Round, former health officer and state criminologist, discussed the use of scientific methods in crime detection

"DuPrene"[1] Now Neoprene

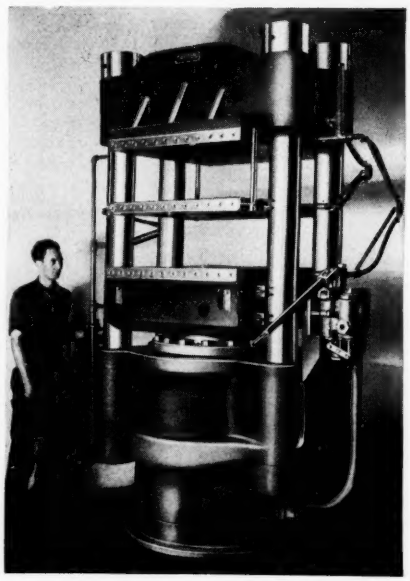
EFFECTIVE at once E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., adopted the generic name Neoprene for its chloroprene polymers previously sold under the trade mark "DuPrene," because experience has demonstrated the need of a name that can be applied both to the unvulcanized material and to the hundreds of products made from it, corresponding to the accepted usage of the word rubber.

The trade mark "DuPrene" could not be applied to products made from it by du Pont customers even if the firm were willing to relinquish its trade mark rights in it because, being derived in part from the name du Pont, its broad use in that manner would be misleading. As an alternative, the company suggested that finished products made from "DuPrene" be designated as chloroprene rubber, but those to whom this suggestion was made rejected it because they feel it might be

(*Continued on page 70*)

[1] Trade mark registered.

New Machines and Appliances



Farrel-Birmingham Heavy Duty Press

Heavy-Duty Press

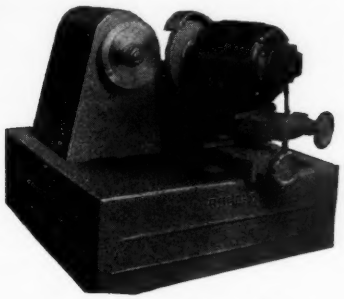
THIS extra-heavy press with three leak-proof plates will produce articles of great accuracy. The design permits use of low pressure for closing and maximum pressure at the squeeze. The 24-inch diameter ram produces an effective pressure of 565 tons. Other structural features include cast-steel cylinder and top cross-head, Meehanite ram and moving cross-head, and massive steel columns with forged nuts. The steam plates of rolled steel are drilled to permit maximum steam circulation and uniform heating.

It is claimed that this design provides great rigidity, positive action over a long period of time, and a uniformly accurate product where precise dimensions are required. Farrel-Birmingham Co., Inc., Ansonia, Conn.

Circular Knife Grinder

THE new circular knife grinder pictured is a rugged tool designed for single or double bevel knives, providing accuracy and uniformity of continuous grinding service with capacity for quality production. Type No. CC1 handles knives up to 14 inches diameter, and No. CC2, those up to 20 inches. Cabinet-base-construction type is furnished for motor drive only. The knives are revolved by separate motor through V-belt connection, giving smooth positive knife revolution during the grinding process. The knife is mounted on an adjustable arbor with provision for solid circular knives or those made in two sections. For thin knives of small diameter suitable supporting flanges are provided. The grinding wheel with guard is mounted directly on the arbor of a ball bearing ¼ h. p. motor with provision for eliminating end thrust, insuring smooth precision grinding accuracy.

The entire grinding wheel and motor assembly has a double adjustable slide mounting to afford any style of grinding desired, single bevel or double bevel. Positive graduated index is provided for setting for any degree of bevel. A swivel adjustment permits grinding bevels either way on the work. The grinding head operates in and out by hand, through a screw and hand wheel. Adjustable steel gibs take up wear. The machine is entirely self-contained with control switches conveniently mounted on the base. A wet grinding attachment is specially available. Samuel C. Rogers & Co., 191-205 Dutton Ave., Buffalo, N. Y.



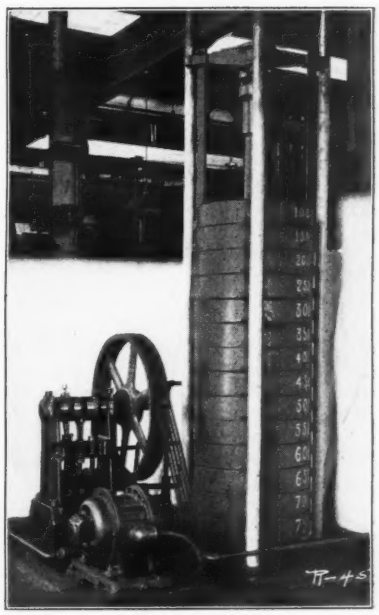
Roger Circular Knife Grinder

Pump Accumulator

NATIONAL laboratory-type pump and adjustable accumulator is designed either for 750 pounds or 1,200 pounds operating pressure. This unit was designed primarily for small platen press installations or for laboratory hydrostatic testing.

The units are equipped with ¾-inch control valve. The accumulator guide rack for carrying the adjustable "dead weights" is fitted with openings for adjustable pins which carry any number of weights for the desired operating pressure. The smaller, or No. 1 unit, is equipped with fourteen weights, each being equal to 50 pounds' pressure per square inch; while on the No. 2, or larger unit, nineteen weights are supplied, each being equal to 60 pounds' pressure per square inch.

The units are quiet in operation and can be equipped with a receiving tank for receiving the outlet water from press or testing cylinders, thus conserving what would ordinarily be waste water. National Rubber Machinery Co., Akron, O.



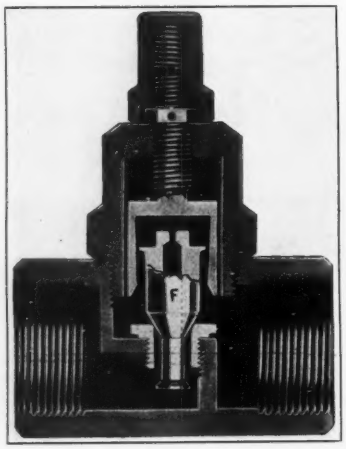
National Small Unit Hydraulic Assembly

Impulse Steam Trap

THE impulse steam trap illustrated operates on a new principle: namely, when liquids flow through two orifices in series with a closed chamber between these orifices, changes in characteristics of the liquids may cause changes in pressure in the closed chamber and this pressure may be utilized to operate a part of the equipment. In the case of the impulse steam trap the changes in pressure which take place in chamber D are due to variations in temperature of the condensate passing through the trap. At low or medium temperatures a small part of the condensate flows past the top flange of valve F, then out through a small orifice in the center of the valve. The pressure in chamber D is sufficiently reduced to permit the valve to open, and most of the discharge passes through the valve seat.

As temperature of the condensate approaches steam temperature, a portion of the hot water flowing through center orifice flashes into vapor because of reduced pressure, and this increase in volume causes choking of the flow at this point which builds up the pressure in chamber D to close the valve. Valve F is the only moving part.

Impulse steam traps are made in six sizes, ½-inch to 2 inches, construction



Yarway Impulse Steam Trap

entirely of bar stock, factory set to operate at all pressures up to 400 pounds in the bronze fitted type and up to 600 pounds in the stainless steel fitted type. Additional features are small size, light weight, and simplicity of installation. Yarnall-Waring Co., Chestnut Hill, Philadelphia, Pa.

Boltless Hydraulic Press

THE accompanying illustration represents a heavy-duty hydraulic press recently developed. This press, which operates at a hydrostatic pressure of 3,000 pounds, with a 26-inch main ram, is entirely boltless, the side plates being fitted to the cylinder and crosshead by means of tapered dovetails and tapered keys that run the full width of the press from front to back. The steamheated platens are 48 inches by 32 inches, and the forged steel crosshead carries a load of approximately 800 tons. In presses operating at a hydrostatic pressure of 2,000 pounds or less cast-steel cylinders are generally used; but for those operating at pressures over 2,000 pounds cylinders machined from solid forged steel blocks are recommended. The press pictured

Erie Boltless Heavy-Duty Press

is equipped with a "push-down" ram on each side for the purpose of parting the molds. The main ram is chilled iron, polished, and loaded with borings and boiler plate punchings to expedite the opening of the press when water is being released from the cylinder. Many presses of this modern construction are being exclusively manufactured for cold and hot pressing, forging, and various other purposes. Erie Foundry Co., Erie, Pa.

Rubber Yarn Coverer

THE broad field for elastic fabrics in the textile industry makes necessary a machine designed to produce covered yarn as a commercially perfect product. This result has been attained by the machine pictured which will handle any size of rubber thread at any spindle speed up to 10,000 r.p.m. It will wrap any number of turns per inch within practical limits and will permit any elongation desired.

Production varies greatly according to the size of the thread. A machine wrapping 112's rubber should produce approximately 30 pounds in 40 hours; when wrapping 30's rubber, it should produce much more than that.

The machine is equipped with 5 h.p. individual motor, variable speed V-belt drive. The speed is altered by the mere turn of a key. The total number of spindles is 80; overall floor space, 14 feet 5 inches by 2 feet 6 inches for a 40-end machine. The net weight of the machine is about 3,500 pounds. H. & B. American Machine Co.

Coordinated Control System

THE coordinated control system is an automatic machine built in the form of a master control station. It consists of recording and controlling instruments built around the so-called "mechanical brain." Each system is designed and engineered for the particular process on which it is used. The instruments are standard, selected for their ability to perform a given duty in cooperation with each of the other instruments in the system.

This system makes possible putting even the most intricate scientific process under complete automatic control, thus eliminating the necessity of leaving the manipulation and control of critical operations in the hands of plant operatives. The system is for processes developed and perfected in the laboratory and pilot plant and depend on rigid control of such factors as the time of operations of valves of all sizes, pumps, blowers, dampers, etc., and the control at a definite value or according to a time program of such variables as temperature, pressure, liquid level, flow, humidity, and speed for their success. It has been found in a number of cases that the coordinated control system was the tie-over from the experimental stage to the full-scale plant stage that made for success.

Coordinated control can be applied to any process of which the exact schedule of operation for best over-all results is known: processes which depend upon close control for product

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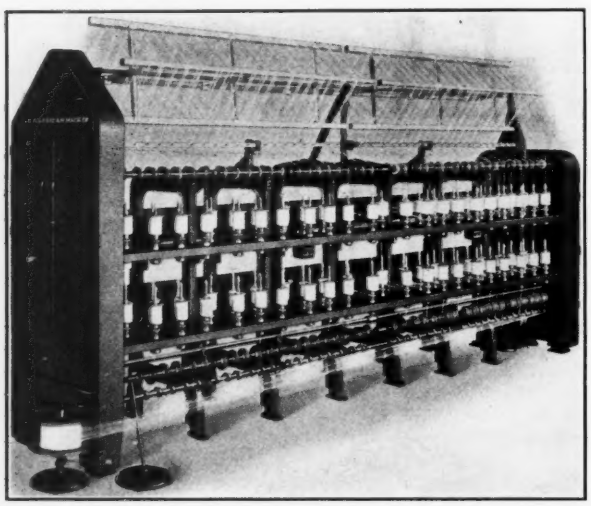
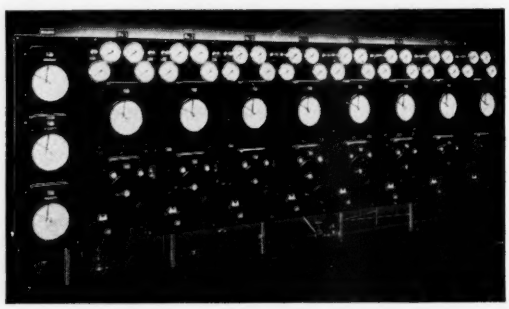


(*Left*) Model "B" Rubber Covering Machine

(*Below*) Coordinated Process Control System



New Goods and Specialties

Seal-O-Matic Tube

A PATENT covering an inner tube which seals punctures in tires while the car is in motion has been issued. The puncture-proof inner tube is made with a layer of plastic self-sealing composition on the inner side of the tube. Holes are closed without loss of air when the penetrating object is removed. This Goodrich product, known as the Seal-O-Matic tube, has been subjected to more than four years of actual road service on thousands of passenger cars and trucks. In a number of instances reported users have removed scores of nails, screws, and other articles from tires after months of uninterrupted operation and without loss of air pressure. The B. F. Goodrich Co., Akron, O.

Showing How Nails Can Be Driven into a Tire Containing a Seal-O-Matic Tube

Mask to Curb Silicosis

THE Navy Department, Washington, D. C., on October 15 announced the development of a mask affording "complete protection" against silicosis, often acquired by workmen engaged in sand-blasting and such work. The mask was designed by W. P. Biggs, departmental safety engineer, and has been tested for several months in navy industrial establishments. The official description of the mask follows.

"It is sturdily constructed and able to withstand the impact of high-velocity abrasives. The protective efficiency and durability of the mask have been thoroughly tested and proved by months of service on both shot and sand-blasting work.

"The incoming air enters the lower

Biggs Respiratory Equipment

part of the face-piece and passes out through double exhalation valves, whose extremely low resistance to the air flow permits low pressure in the face-piece and assures an ample supply of air.

"A latex-covered silk hood which is extremely low in weight, tough and resilient to the high-velocity impact of the abrasive particles, fits neatly over the head and shoulders of the operator and fastens at his waist, exposing only the lens section of the face-piece.

"The air passing out of the exhalation valves from the mask serves to inflate the hood slightly, providing an air-cushioning effect, which increases the natural resistance of the fabric to the wearing action of the shot or sand.

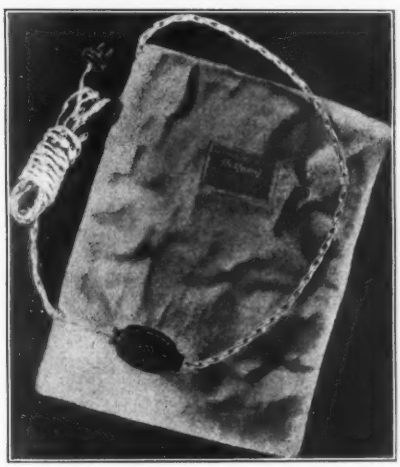
"The mask has a flow control valve with a 'bump-proof' adjustment. The setting cannot be changed accidentally. In the event the air supply should fail, or become unusable for any reason, a lever extending over the air-supply nipple of the flow control valve immediately detaches the mask from the air line when pulled upward by the operator."

Its development is the result of several years of research by navy experts, Mr. Biggs explained. The interest of officials was aroused when they discovered that 75 out of every 100 men applying for work as sandblasters already had silicosis in varying stages of development.

Acidproof Textile Products

WORKMEN in chemical plants manufacturing mineral acids and corrosive and poisonous substances and those who use such products are in need of special protective clothing to safeguard them from chemical burns. This important personal safeguard for chemical workers is met by the application of a vulcanizable dip coating of specially compounded rubber latex upon the exterior of such garments as overalls, jumpers, dungarees, pants, gloves, mittens, etc.

The process of proofing is known as Safetex and affects only the outside, leaving the body side of the garment as warm, dry, soft, and flexible as before treatment. No cold or sticky surface can come in contact with the wearer's skin. Safetex Co., Inc.



GE Downy Heating Pad

New Heating Pads

TWO new heating pads, the Downy and the "Volume of Comfort," with soft eiderdown covers in tan, pink, orchid, or apricot, have been announced by the General Electric Appliance and Merchandise Department. Each heating pad is equipped with a conveniently located three-heat switch, two non-radio-interfering thermostats, and a ten-foot cord set. Overall dimensions are 12 by 15 inches. A slip-on rubberized waterproof cover is furnished with each Downy pad. The "Volume of Comfort" model is attractively packaged in a compact container when not in use. Both pads operate on 115 to 125 volts, alternating current, and draw 60 watts.

Rubber Industry in America

OBITUARY

Ashley & Crippen

F. G. Morley

Frank G. Morley

A SUDDEN heart attack on November 27 caused the death of Frank Garon Morley, vice president and general manager of The B. F. Goodrich Co. of Canada, Ltd., Kitchener, Ont., since May 24, 1935. He joined the Goodrich organization in Akron in 1916 as a member of the auditing department. The next year he became traveling auditor and two years later was appointed to the treasurer's department. On April 1, 1923, Mr. Morley was sent to the Canadian company as credit and operating manager and became general credit manager in 1925. He was named secretary-treasurer the next year.

Mr. Morley was born in Lacrosse, Wis., July 28, 1892. He attended elementary and Madison high schools and the University of Wisconsin, graduating from the latter a B.S. in 1915.

He belonged to the Canadian Credit Institute and the Rotary, Granite, and Flying clubs.

Mr. Morley leaves his wife, a son, and a daughter.

Thomas J. McKeon

THOMAS J. McKEON, a director and vice president in charge of sales of the Auburn Rubber Corp., Auburn, Ind., since early 1933, died November 27. Mr. McKeon's association with the rubber industry covered a period of twenty-five years. He devoted a great part of his time to developing items for shoe factories and findings trade and was also active in the cement-on-sole field. For several years Mr. McKeon was factory manager of the Panco Rubber Co., Chelsea, Mass., then of the Lancaster Tire & Rubber Co., Lancaster, O., and of the rubber heel and sole division of the Firestone Footwear Co., Hudson, Mass. He held a similar position with Auburn Rubber before being made vice president.

The deceased was born in West Warren, Mass., August 2, 1886, and attended the Warren public schools. He also belonged to B.P.O.E., Chelsea, Mass., Lodge.

Burial was at St. Paul Cemetery, Warren, Mass.

Andrew M. Wightman

ANDREW M. WIGHTMAN, associated with the rubber industry for over 35 years, died November 21 after a short illness. He resided in Oak Park, Ill.

Mr. Wightman was born April 10, 1883, in Chicago, Ill., and began his affiliation with the rubber industry with Morgan & Wright of that city. Then, joining the LaCrosse Rubber Mills Co., he became superintendent of the mechanical goods department. Following this connection, he served as factory superintendent for the Vail Rubber Co., Chicago, and St. Joseph, Mich., and also for the Williams-Bowman Rubber Co., Cicero, Ill.

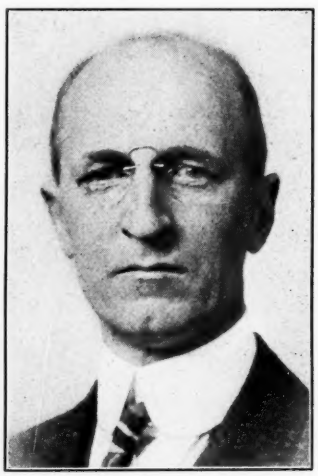
For several years Mr. Wightman, who studied at the Lewis and Armour Institutes in Chicago, also did experimental work on rubber and other vulcanized products at the Staunton Laboratories. During the past seven years he was superintendent of the rubber division of the Rapid Roller Co., Chicago manufacturer of printers' rollers. As such he was instrumental in the development of the rubber roller and took out patents in this connection.

Mr. Wightman was a member of the Rubber Division of the American Chemical Society. He is survived by his wife and a son as well as by his mother and a sister.

Andrew M. Wightman

Walter L. Pipes

WHILE playing golf December 13, Walter Logan Pipes, head of the patent department in charge of litigation for the United States Rubber Co., 1790 Broadway, New York, N. Y., since 1924, died suddenly. He was born in Washington, D. C., September 27, 1886. He went to the local grade and high schools. Then, while working in the United States Bureau of Standards, he attended George Washington University. Later he matriculated at the University of West Virginia and received an M.E. in June, 1911. Four years after, he won an LL.B. from Georgetown University. Meanwhile he had been working in the United States Patent Office and in 1916 completed a special course in patent law at Georgetown.



Walter L. Pipes

In May, 1916, Mr. Pipes resigned from the Patent Office, where he had been assistant examiner since June, 1911, and took a position in the patent department of the Singer Mfg. Co.,

(*Continued on page 72*)

EASTERN AND SOUTHERN

EARLY reports for November indicate business activity in general established a new high for the recovery period. Industrial activity, which usually shows no change for November as compared with October, increased. Daily average output of steel for December exceeded the November rate which was the highest since September, 1929. Retail sales of commodities rose sharply, mainly because of Christmas buying, the best in years. Employment also gained, although there are reports of shortage of skilled labor and of some good unskilled labor. Inventories have been increased, and this year-end inventory period will see probably the heaviest stocks on hand since former "normal times." Supplies are being built up, not only to anticipate price increases, but to assure required needs for stepped-up production schedules. The extra dividends, bonuses, and salary increases also all added to the general good. There is no sign of slackening in business volume, unless it is a temporary setback, through the next several months. During this time manufacturing costs, including raw materials and labor, are bound to be higher. The only discordant note is labor trouble, especially on the West Coast and in the automobile industry.

U. S. Rubber Notes

A New Plan to Merchandise Tires

To meet changing business conditions and also to conform more clearly to new legal requirements the United States Rubber Co., 1790 Broadway, New York, N. Y., has adopted a plan for 1937 in respect to its distribution of tires. The plan, announced by L. D. Tompkins, vice president, Tire Division, should afford the U. S. Dealer an opportunity to improve his business capacity and at the same time assist in stabilizing the price structure.

The plan is outlined briefly below. Details are incorporated in an agreement which will be executed between U. S. Rubber Products, Inc. (the manufacturer) and a new company (the distributer) as soon as formalities in connection with organization will permit.

1. Commencing January 1, 1937, U. S. Dealers will be supplied with U. S. brands of tires by the U. S. Tire Dealers Mutual Co. instead of U. S. Rubber Products, Inc., as heretofore.

2. The Mutual Co. will obtain its tires from the manufacturer (U. S. Rubber Products, Inc.) and will have the same purchasing advantages as any other volume purchaser in the replacement field; that is to say, the Mutual Co. will buy its tires at the same percentage over manufacturing cost as will other large volume accounts. There will be no allowance for volume in the manufacturing cost.

3. The Mutual Co. will take over from the Products Co. the operation of the 28 company-owned stores and other contracts related to U. S. brands of tires in the replacement field together with all required facilities, inventories, and accounts at their cost. The Products Co. will continue to finance the cost of distribution by lending the required funds to the Mutual Co. and will charge interest at legal rates. Certified public accountants will audit the books and accounts of the Mutual Co. and will certify as to the accuracy of the annual statement.

4. The Mutual Co. will perform all the usual functions of a sales organization, as selling, shipping, warehousing, sales promotion, advertising, etc., and will use and take full advantage of the U. S. system of distribution, including its personnel, composed of men of merchandising experience with knowledge of the problems of local retail selling as well as national distribution.

5. The Mutual Co. will distribute its tires through the U. S. Dealers at prices based upon established lists and discounts therefrom, as at present.

6. The Mutual Co. will select dealers from different parts of the country to serve as an advisory council for advice on matters pertaining to the distribution of tires.

7. The Mutual Co., for the first time in dealer history, establishes a formula for a further payment, if earned, under conditions stated below.

In the event that at the end of the year it is found that the cooperative efforts of the dealers and the Mutual Co. have reduced expenses of the Mutual Co. to a point where a fund or surplus remains, then that fund, after setting up sound business reserves, will be distributed on a mutual basis among the dealers.

Conditions unfavorable to the accumulation of the fund, as unfair and unsound competitive practices usually resulting in price wars beyond the control of the Mutual Co., would adversely affect such possible further payments.

8. The Mutual Co. may continue the plan for further periods with the understanding that modifications may be required by changes in the laws or for mutual advantage.

Company Activities

A general display of U. S. Rubber products was held in the Hotel Hildebrecht, Trenton, N. J., November 18, 19, and 20, for view by retail merchants. Howard Livesey, of Philadelphia, Pa., and John Vaughn, of Trenton, had charge of the exhibit. Included in the showing were wearing apparel, featuring waterproof cruise toppers for women, a new product, and rubber footwear in navy blue.

U. S. Rubber Products has leased for a term of years the building at 336-38 Central Ave., Newark, N. J., which it will use as a direct branch for North Jersey. For several years the company had such a branch in Newark, but closed it in 1931. Increased business and greater demand for stock and service caused the company to reestablish this branch.

On November 30 the company raised the wages of 2,000 workers at its Passaic, N. J., plant.

Among the Personnel

Francis B. Davis, Jr., president of U. S. Rubber, has accepted chairmanship of the committee of members of the rubber industry which will participate in the campaign to sell $27,829,500 of debenture bonds to finance construction of the New York World's Fair, which opens April 30, 1939. The committee which Mr. Davis will head is one of 68 volunteer groups representing trade and industry organized by the New York World's Fair Bond Sales Committee. According to present plans, members of Mr. Davis's group will represent all divisions of rubber manufacturing and those wholesale and retail concerns engaged principally in selling rubber products. Distributing concerns, selling tires or other rubber products as a secondary line, will be canvassed for the purchase of Debentures by the Automotive Committee.

Arthur Reeve, of the New York office, on December 2 at the Drake Hotel, Chicago, Ill., celebrated his tenth wedding anniversary as well as his fifty-third anniversary with the United States Rubber Co., a period exceeded by no one else in the entire organization. Among those present was J. B. Spotswood, manager of the company's Chicago branch, with supervisory control over branches in Minneapolis, Milwaukee, Des Moines, and Davenport. Mr. Reeve, formerly supervisor of production of the U. S. footwear division, now is general merchandise auditor, and his duties take him to the company's branches, plants, etc., all over the country.

W. F. Regan, of the New York office of U. S. Rubber Products, was guest speaker at the meeting of the Westfield (N. J.) Old Guard on December 9. His subject, "The Romance of Rubber," was illustrated by motion pictures covering the history, manufacture, and usages of rubber in the world today.

Hohweiler Rubber Co., Morrisville, Pa., is operating to capacity and is working on large orders for baseball plates and other athletic material for southern states.

Hewitt Rubber Co., Buffalo, N. Y., recently increased wages for its 500 employes by 7½%. The company also distributed a special Christmas bonus ranging from $10 to $50.

Freeport Texas Changes

Freeport Texas Co., a leading sulphur company, at a special stockholders' meeting in Wilmington, Del., on December 9 voted to change its name to Freeport Sulphur Co., the name of its principal subsidiary. This subsidiary is being liquidated and after January 1, 1937, the present parent company, operating under its new name, will be engaged directly in the business of producing and marketing sulphur. At the meeting the stockholders also voted to reduce the authorized capital stock by 12,699 shares of preferred stock which, under conversion privileges, have been converted into common stock, and to reduce the capital of the company by $846,600, representing the difference between the par value of the preferred stock converted and the par value of the common stock issued upon conversion.

In commenting on these changes Langbourne M. Williams, Jr., president of the company, declared the revision in the corporate structure, involving liquidation of the present Freeport Sulphur Co. and the change of the holding company to an operating company is in line with current trends toward simplification of corporate structures and will effect tax and other savings.

In explanation of the reduction of the company's capital, he said, "the preferred stock of the company is convertible into common stock on or before February 1, 1945, at the rate of 3⅓ shares of common stock for each share of preferred stock converted on or before February 1, 1938, and at the rate of 2½ shares of common stock for each share of preferred stock converted between February 1, 1938, and February 1, 1945.

"Pursuant to this conversion privilege, 12,699 shares of preferred stock having an aggregate par value of $1,269,900 have been converted into 42,330 shares of common stock having an aggregate par value of $423,300. The authorized capital stock has been reduced by 12,699 shares of preferred stock converted, and the capital of the company has been reduced by $846,600, the difference in par value.

"The capital structure of the Freeport Sulphur Co., after appropriate certificates have been filed in Delaware," Mr. Williams continued, "will consist of 12,301 shares of $100 par value 6% cumulative convertible preferred stock and 850,000 shares of $10 par value common stock of which 796,371 shares are now outstanding."

General Dyestuff Moves

Every departmental activity of General Dyestuff Corp. is now coordinated in a newly erected nine-story building at 435 Hudson St., New York, N. Y. Except for ½-floor tenanted by the General Aniline Works, for which GDC is sole selling agent, the company occupies the entire building, which offers not only every facility for the efficient operation of its executive and general offices, but also ample space for main laboratories, shipping and warehouse rooms.

New Home of General Dyestuff Corp.

The new structure is so constructed as to permit the erection of three additional stories should increased business warrant further expansion. Many of its interior features are exceptional. For instance many of the wall partitions are of the new structural glass brick.

General Dyestuff Corp.'s activities are thus centralized and modernized to meet the increasing demands of industry for complete service and a comprehensive line of dyestuffs for wool, cotton, silk, rayon, paper, leather, paints, dry colors, resins, and various other products requiring colors or allied materials.

American Patent System Centennial

A "Research Parade" was featured on the program presented November 23, 1936, in Washington, D. C., in celebration of the centennial of the American patent system. The first episode in the series illustrated conditions little less than a century ago when Henry L. Ellsworth, Commissioner of Patents in 1844, predicted that with the invention of steamboats and railroads the limits of human ingenuity and progress must be close at hand. Successive episodes of the "Parade" displayed progress in the discovery in the fields of electricity, radio, sound, chemistry, medicine, standardization, and testing.

In the field of synthetic products Ernest K. Bridgwater, of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., showed the development of synthetic rubber known as "DuPrene"[1] which outclasses natural rubber in its positive resistance to deterioration by oil and oxidizing agencies, thus greatly improving and extending the industrial value of rubber. Progress in glass technology was demonstrated by new forms of glass, glass yarn, glass braid, glass tape, and woven glass textiles.

[1] Trade mark registered.

National Power Show

The Twelfth National Exposition of Power and Mechanical Engineering was held in Grand Central Palace, New York, N. Y., November 30 to December 5, 1936. This show was the largest one held thus far. Displays of the 300 exhibitors occupied three floors of the capacious building; whereas the space required for the previous Power Show was but two-thirds that area. The general exhibition was highly interesting and instructive because it presented a bird's eye view of the field, yet with opportunity for close inspection, enabling the engineer, the executive, and the research man to make a comprehensive survey of the power equipment and mechanical engineering industries. As an established biennial event, the Power Show sets a standard by which individual companies may compare their status and guide their course.

For those concerned in the equipment and operation of rubber plants special interest attached to exhibits of temperature control and recording devices shown by The Bristol Co., Waterbury, Conn.; Taylor Instrument Cos., Rochester, N. Y.; Brown Instrument Co., Philadelphia, Pa.; the steam accessory equipment of the Barco Mfg. Co., Chicago, Ill.; Yarnall-Waring Co., Philadelphia, Pa., and the power accessories and specialties of Armstrong Cork Products Co., Lancaster, Pa.; Cutter-Hammer, Inc., Milwaukee, Wis.; Eagle-Picher Sales Corp., New York, N. Y.; Garlock Packing Co., Palmyra, N. Y.; Gates Rubber Co., Denver, Colo.; Jenkins Bros., New York; Johns-Manville, New York; Keasby & Mattison Co., Ambler, Pa.; Link-Belt Co., Chicago, Ill.; Olsen Testing Machine Co., Philadelphia; Peerless Machine Co., Racine, Wis.; Scoville Mfg. Co., Waterbury; and other concerns.

Witco Plant under Way

Construction on the new Witco carbon black plant at North Plains, Tex., is proceeding at such a rapid rate that first production is expected early in February. The newly formed company has headquarters at 295 Madison Ave., New York, N. Y. The plant, about a mile north of the McKee plant of the Shamrock Oil & Gas Co., will have a capacity of 70,000,000 cubic feet per day. It is being built on the most modern lines and will contain the most up-to-date equipment obtainable.

A neatly laid out village of modern homes for workmen is already built, and construction of a siding to the plant was completed in remarkably short order by the Rock Island Railroad.

A subsidiary office has been established at 832 Amarillo Bldg., Amarillo, Tex., and a complete engineering staff is pushing the work ahead of schedule.

Chevrolet for its 1937 models has increased tire sizes from 5.50-17 to 6.00-16 on a wider rim to give greater deflection and more traction.

Blank & Stoller, Inc.

D. C. McRoberts

D. C. McRoberts Joins Kaysam Corp.

D. C. McRoberts, editor of INDIA RUBBER WORLD, resigned that position as of January 1, 1937, to become associated with Kaysam Corp. of America, as assistant to the president, Allan A. Ryan, Sr.

In his new connection Mr. McRoberts, will continue his close contact with the rubber industry, which has extended over a period of more than twenty-five years.

Mr. McRoberts' services will also continue to be available to INDIA RUBBER WORLD as consulting editor.

The publishers and the members of the staff of INDIA RUBBER WORLD, while regretting keenly Mr. McRoberts' leaving a post he has filled most ably, at the same time wish him a full measure of success in his new connection.

Kaysam Corp. of America, One E. 57th St., New York, N. Y., lists among its officers and directors men prominent in various phases of the rubber industry. The officers are: Allan A. Ryan, Sr., president; Fortune Peter Ryan, treasurer; and A. F. Long, secretary. The board of directors consists of the following members: Elmer Roberts, vice president, United States Rubber Co.; David A. Cutler, president, Alfred Hale Rubber Co.; Bradley Dewey, president, Dewey & Almy Chemical Co.; John H. Hunter, Sr., (representative, Kaysam, Ltd.,) J. H. Hunter & Son, Inc.; Bernard Jackson, (representative, Kaysam, Ltd.,) Metal Traders, Inc.; T. F. Davies Haines, Appleton, Rice & Perrin; Theodore S. Ryan; and Allan A. Ryan, Sr.

The Barber Asphalt Co., 1600 Arch St., Philadelphia, Pa., has changed its name to The Barber Co., Inc. The firm, which manufactures Genasco Hydrocarbon, etc., has other offices at New York, Chicago, and St. Louis and plants at Maurer, N. J., and Madison, Ill.

Wishnick-Tumpeer, Inc., 295 Madison Ave., New York, N. Y., has added to its chemical staff E. M. Allen, formerly of the research and development laboratory of the Columbia Chemical Division of the Pittsburgh Plate Glass Co., at Barberton, O. One of Mr. Allen's major developments during his ten years' service at Columbia was "Calcene," a fine particle sized calcium carbonate reenforcing pigment used principally for rubber compounding. The last six years he has devoted almost entirely to the development of pigments such as chalk.

Wishnick-Tumpeer, because of increased business in its New England territory, has moved to larger quarters at the same address, Room 842, 141 Milk St., Boston, Mass. W. C. Weller is in charge of this office.

Foster D. Snell, Inc., 305 Washington St., Brooklyn, N. Y., has announced that Leonard C. Cartwright, B.S.,Ch.E. University of Florida, 1927, A.M. Harvard University, 1935, recently joined its staff. He has had extensive experience in the industry as research, development, and consulting chemist and engineer. He was for a time in charge of testing reagent chemicals for Sterling Products Co., Easton, Pa., did refrigeration research for Comstock & Wescott, Inc., Cambridge, Mass., and spent a year in electronic research for Raytheon, Inc., Cambridge. Mr. Cartwright also was on the research staff of Skinner & Sherman, Inc., Boston, Mass., for three years, then was called to Venezuela as chemical engineer in charge of an experimental caustic soda factory. Since returning to the United States he has completed a special research program for Sterisol Ampoule Corp., Long Island City, N. Y., on the commercial production of solutions for intravenous injection.

Research on Tire Chains

An industrial fellowship to investigate broadly the durability of automotive tire chains has been founded at Mellon Institute of Industrial Research by The McKay Co., Pittsburgh, Pa., which manufactures commercial chains of all types. This fellowship, which began operation on September 15, 1936, has for its objective the production of better chains, particularly for the motorist. A comprehensive program of basic research is being carried on, including studies of the design, materials, processes of manufacture, and testing of chains.

The McKay Fellowship is headed by Dr. David F. Helm, who received his professional education at Denison University (A.B., 1928), Michigan State College (M.S., 1930), and Ohio State University (Ph.D., 1934). Prior to joining the research staff of Mellon Institute, Dr. Helm was employed as research engineer on cast iron metallurgy in the Engineering Experiment Station of the Ohio State University; previously he was a chemist with the Midgley Foundation, Columbus, O.

Blank & Stoller, Inc.

S. C. Stillwagon

S. C. Stillwagon Joins "India Rubber World" Staff

S. C. Stillwagon recently resigned his position with Naugatuck Chemical, Naugatuck, Conn., to become a member of the editorial staff of INDIA RUBBER WORLD.

With a chemical engineering education followed by more than 20 years of technical and manufacturing directional responsibilities in the various branches of the rubber business, Mr. Stillwagon comes to this organization with a full comprehension of the important problems of the rubber industry.

Mr. Stillwagon pursued a liberal arts course at Hiram College and then majored in chemistry at Case School of Applied Science. Upon graduating from the latter institution, he became associated with the General Laboratories, United States Rubber Co., New York, as research chemist. He later served the Mechanical Rubber Co., Chicago, Ill., during several years as chief chemist.

Since then Mr. Stillwagon has been engaged continuously in technical and manufacturing administrative duties with various rubber and chemical plants.

He enjoys a wide acquaintance in the rubber and allied industries.

American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa., will hold the next meeting of Committee D-13 on Textile Materials in Providence, R. I., March 10 to 12. The special feature of this meeting will be a technical symposium on atmospheric conditions as related to conditioning materials for test.

Sherman Robinson, of Whittaker, Clark & Daniels, Inc., mineral whites, 260 W. Broadway, New York, N. Y., is at St. John's Hospital, Brooklyn, recovering from an operation.

The 1937 American Toy Fair will be held at the Hotel McAlpin, New York, N. Y., April 5 to 17 under the auspices of the Toy Manufacturers' Association.

Rubber Trade Association of New York, Inc., 95 Broad St., New York, N. Y., at a recent election of officers selected the following: president, Robert Badenhop (reelected), Robert Badenhop Corp.; vice president, H. Muehlstein (reelected), H. Muehlstein & Co., Inc.; treasurer, Louis V. Keeler, The Avia Co.; secretary-manager, B. G. Davy (reappointed); board of directors, Messrs. Badenhop, Muehlstein, and Keeler; Wm. E. Bruyn, Littlejohn & Co., Inc.; A. L. Grant, Charles T. Wilson Co., Inc.; D. A. Paterson, H. A. Astlett & Co.; and W. G. Smith, Jr., The Meyer & Brown Corp.

Herman Muehlstein, president of H. Muehlstein & Co., Inc., dealer in crude and scrap rubber and hard rubber dust, 122 E. 42nd St., New York, N. Y., on December 5 accepted the chairmanship of the rubber division of the United Hospital Campaign Committee. This is one of 68 divisions representing all branches of commerce and industry throughout New York, formed to cooperate with the campaign committee to help the city's voluntary hospitals meet the mounting expenses of free care given patients in their effort toward community health protection.

Virginia Rubatex Corp., manufacturer of hard and soft cellular rubber products, Bedford, Va., through Vice President Wesley L. Smith has announced the appointment of J. E. Cotter as chief chemist. He formerly held a similar position with the Tyre Rubber Co., Andover, Mass. The Rubatex firm plans to expand production, and additional modern machinery and other equipment are being purchased.

The O'Sullivan Rubber Co., Inc., 366 Madison Ave., New York, N. Y., with factory at Winchester, Va., is celebrating its fortieth anniversary. The firm, in connection with this event, released the following:

In 1896, Humphrey O'Sullivan, an employe of a printing company in Lowell, Mass., suffered from fatigue and muscular aches brought about by working on a hard cement floor. One day he placed a rubber mat on the floor where he stood. Soon his aches disappeared. Next he cut out of this mat two small pieces of rubber and attached them to the heels of his shoes. The comfort derived from these heels prompted an immediate decision on his part to go into the manufacture of molded rubber heels. This was the beginning of a new industry which now flourishes the world over.

D. J. Gregory, who has had wide experience in Europe and the United States as a designer of high-speed hydraulic presses, has joined A. B. Farquhar Co., Ltd., York, Pa., as chief engineer of the hydraulic press division. In Europe Mr. Gregory's experience includes that with the Krupp plants in Germany, and the Putilov Works in Russia; while that in the United States includes Bethlehem Steel, Southwark Foundry & Machine Co., Birdsboro, Farrel-Birmingham Co., Inc., and Baldwin-Southwark Corp. He has developed new, modern hydraulic presses for the rubber, plastic materials, metal trades, fiber, veneer, paper, aviation, electrical, hardware, and processing industries. The Farquhar company, with a background of 80 years of manufacturing experience, is expanding its hydraulic press division, which includes high-speed production presses, hot and cold process presses, and automatic and semi-automatic types.

D. J. Gregory

The National Association of Manufacturers held its annual dinner December 9 at the Waldorf-Astoria Hotel, New York, N. Y. Among the business and industrial leaders who sat at the head table and were introduced one by one to the huge audience were: H. L. Derby, president, American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York; Walter Robbins, chairman, General Cable Corp., 420 Lexington Ave., New York; Edgar M. Queeny, president, Monsanto Chemical Co., St. Louis, Mo.; J. D. Tew, president, The B. F. Goodrich Co., Akron, O.; N. W. Pickering, president, Farrel-Birmingham Co., Ansonia, Conn.; H. Boardman Spalding, treasurer and vice chairman, A. G. Spalding & Bros., 105 Nassau St., New York; A. W. Robertson, chairman, Westinghouse Electric & Mfg. Co., 150 Broadway, New York; F. B. Davis, Jr., president, United States Rubber Co., 1790 Broadway, New York; Lammot du Pont, president, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.; H. W. Prentis, Jr., president, Armstrong Cork Co., Lancaster, Pa.; and Gerard Swope, president, General Electric Co., 570 Lexington Ave., New York.

The Canadian Consolidated Rubber Co., Ltd., a subsidiary of the Dominion Rubber Co., both of Montreal, P.Q., Canada, has called for redemption on April 1, 1937, at 110 and interest its $2,600,000 of 6% first mortgage bonds due in 1946.

FINANCIAL[1]

Unless otherwise stated, the results of operations of the following companies are after deductions for operating expenses, normal federal income taxes, depreciation, and other charges. Most of the figures are subject to year-end adjustments.

Anaconda Copper Mining Co., 25 Broadway, New York, N. Y., and subsidiaries. First nine months of 1936: consolidated net income, $9,940,132 after interest, estimated taxes, provision for depreciation, and obsolescence, but before depletion, equals $1.15 each on 8,674,338 shares of capital stock outstanding. No provision was made for surtax on undistributed earnings. The equity of the company in the combined net earnings for the nine months of the unconsolidated subsidiaries, principally Anaconda Wire & Cable Co., Mountain City Copper Co., Walker Mining Co., amounts to $1,076,009 in excess of dividends received from such companies, and such excess is not included in this report. In the nine months ended September 30, 1935, the company earned $7,856,153, or 91¢ a share.

The nine-month report of the Andes Copper Mining Co., controlled by Anaconda, showed a consolidated net income of $532,518 before depletion, equal to 15¢ a share on 3,582,379 capital shares. No comparison is available, but for the entire year of 1935 the net income before depletion was $418,136, or 12¢ a share.

Firestone Tire & Rubber Co., Akron, O., and subsidiaries. Fiscal year ended October 31: net profit $9,142,653.92 after interest, depreciation, federal income taxes, and other charges. After dividends on the series A 6% cumulative preferred stock, the net profit is equivalent to $3.28 each on 1,932,497 shares of $10-par common stock. In the preceding twelve months, the company earned $5,649,146, or $1.53 each on the 1,866,007 common shares then outstanding.

Current assets on October 31, including $11,279,479.45 cash, amounted to $75,693,520.46 and current liabilities, $24,048,227. This compares with cash of $11,613,287, current assets of $66,743,787, and current liabilities of $19,610,234 a year before. Inventories increased to $43,762,364 from $35,995,720.

Sales were $135,701,916, a 14% increase compared with the previous year.

Flintkote Co., East Rutherford, N. J., and subsidiaries. January 1 to October 10, 1936. net income, $944,881, after taxes and other charges, according to a report to the New York Stock Exchange.

Seiberling Rubber Co., Akron, O. Year ended October 31: net profit after federal income taxes and other charges $103,385.

Norwalk Tire & Rubber Co., Norwalk, Conn. Year ended September 30:

(*Continued on page 72*)

[1] Dividends Declared on page 94.

OHIO

INCREASED activity recently among rubber manufacturers was due to expansion in tire plants as well as to a substantial gain in orders for boots, shoes, and mechanicals. Tire replacement sales, however, have declined. In the rubber industry for 1936 healthier merchandising conditions and some improvement in profit ratios have been counterbalanced in a large measure, by unsettled labor conditions. Decentralization plans by manufacturers are still under way. Bankruptcies in the industry have declined. Great optimism prevails in the industry for 1937.

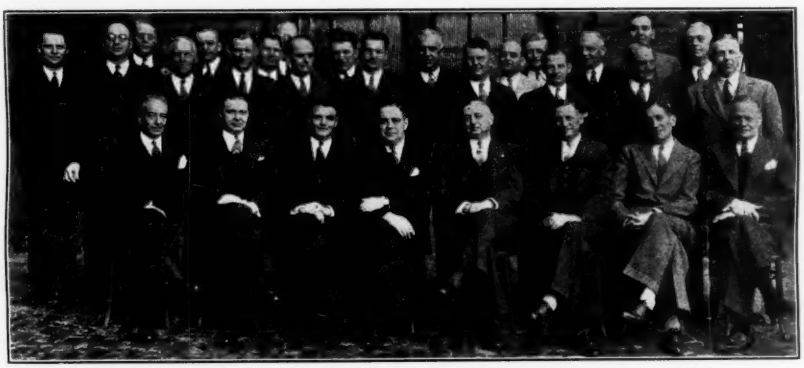
The Republic Rubber Co., Youngstown, as a fitting close to a highly successful fiscal year ending October 31, held a sales conference October 27 to 30, attended by all members of the sales organization from coast to coast. The conference was under the direction of O. S. Dollison, vice president in charge of sales; and discussions were led by H. P. Schultz, sales manager, E. M. Ikirt, treasurer, H. W. Croysdale, factory manager, C. H. Zieme, service engineer, and A. Brill, development manager. During the meetings new products were introduced, the sales promotional program for the coming year was discussed, and new applications for mechanical rubber products were thoroughly considered.

Republic Rubber, an Ohio corporation, which became a subsidiary of Lee Rubber & Tire, on June 9, 1923, has been merged with the Lee corporation and will operate as The Republic Rubber Co., Division of Lee Rubber & Tire Corp. The general offices of the Division will be retained at Youngstown, and the present officers of Republic will become officers of Lee, so that the same management and policies will prevail as heretofore.

The Goodyear Tire & Rubber Co., Akron, through its directorate, to give shareholders who have not yet acted opportunity to do so, has extended until January 15, 1937, the period within which exchanges of its second preferred stock for its new senior $5 convertible preferred and common stock (or negotiable scrip for fractions of common shares) may be made under the plan for the rearrangement of capitalization. The board also declared a dividend of $4.25 per share on the new $5 convertible preferred to be issued on exchanges under the plan against deposits of second preferred stock on or before January 15. This dividend will be payable January 25 to original holders of the new $5 convertible preferred stock issued on exchanges after December 18, 1936. The stock, when issued, therefore, will be ex-dividend. It is not planned to issue any stock under the terms of this extended exchange offer until January 2, 1937, when new shares will be issued in exchange for all second preferred stock received between December 19, 1936, and January 2, 1937. Thereafter, and up to the close of business on January 15, the new shares will be issued currently as second preferred stock is presented for exchange. Returns through December 17 indicated holders of approximately 565,000 shares, or over 75%, of second preferred stock have deposited them for exchange into the new senior $5 convertible preferred stock and common stock.

Firestone News

John W. Thomas, president of the Firestone Tire & Rubber Co., Akron, on December 15 said in his annual report to stockholders that operations had been at 91% of capacity, compared with 82% in the preceding year.



Sales Force Attending The Republic Rubber Co. Sales Conference

Seated: R. M. Gattshall, Manager Distributer Sales; E. M. Ikirt, Treasurer; G. L. Smith, Assistant Sales Manager; H. P. Schultz, Sales Manager; O. S. Dollison, Vice President in Charge of Sales; H. W. Croysdale, Vice President and Factory Manager; A. Brill, Development Manager; C. H. Zieme, Service Engineer. Standing: H. H. Sprinkle; S. R. Colucci; H. E. Stone; J. P. Bird, Assistant Manager Mechanical Sales; J. H. Vandawarker; G. J. Wyrough; C. P. Nolte; T. D. Britton; N. B. Norris; M. W. Clark; V. C. Steck; A. A. Schley; A. W. Carriere; H. F. Morneweck, Assistant Manager Mechanical Sales; C. B. Cannon; C. R. Conklin; C. W. Stanton; M. C. Meyer; N. M. Grove; J. F. Vogt, C. R. Case

Metropolitan News Photos

Ellwood F. Riesing, Head of Firestone's Mechanical Rubber Division, boarding the United Air Lines Plane for New York; He is Making Arrangements to Send Tires by Air Express to Firestone Customers

"For the past six months," he added, "we have maintained higher weekly earnings than in 1929, with a shorter number of working hours per week."

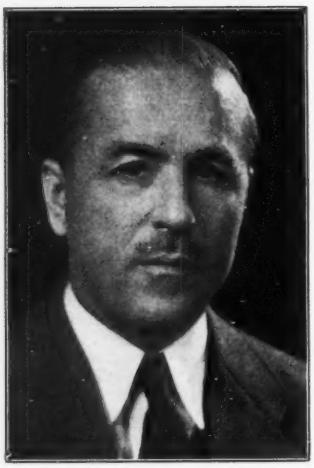
Firestone at its plant at Port Elizabeth, South Africa, which opened September 14, now operates at a daily capacity of 1,000 tires and tubes. For the time being only these two items will be manufactured, but the factory has been constructed to allow for expansion in case the production of batteries, spark plugs, and other Firestone products is decided upon. John L. Cohill, formerly in charge of the Argentine company, is vice president and general manager of the South African undertaking.

Robert T. Dundon, of the general offices in Akron, sailed December 2 for Liberia, Africa, where he will serve as an accountant for the Firestone plantation at Cape Palmas. He will remain in Liberia two years.

Goodrich Activities

J. D. Tew, president of The B. F. Goodrich Co., Akron, recently released the following statement:

"Improved business conditions in the rubber industry in 1936 are shown not only by the best record for sales and profits since 1929, but by a substantial increase in the number of employes at work. A further indication of the gains recorded during the past year by the rubber industry, which pays the highest average hourly wage of any industry in



G. E. Brunner

the world, is seen in the fact that it also offered a greater number of working hours for employes than in 1935.

"In the Goodrich company approximately 15,000 hourly workers are employed, of whom nearly 40% have a record of employment of ten years, and more than 12% in excess of 20 years—an indication of satisfactory relationships between employe and employer.

"The record established by the rubber industry during 1936 was due primarily to three factors: improvement in general business conditions, elimination of price wars within the industry, and increased production of motor cars and trucks.

"For 1936, tire sales as a whole reached approximately 52,000,000 units, as compared with 49,000,000 units in 1935. For 1937 we estimate that this total may reach approximately 54,000,000 units. The estimated tire consumption in 1937 is predicated primarily on the increase in motor car production. We do not estimate that the number of tires sold for replacement will be appreciably greater than in 1936; as a matter of fact, many automobiles go through their first ownership with the original set of tires. . . .

"From all indications the consumption of rubber in the United States in 1937 will appreciably exceed the 1936 consumption, but due to additional releases of crude rubber authorized by the Regulations Committee in London on December 15, the production of crude rubber will, in my opinion, exceed the consumption in 1937.

"Further improvement during 1937 and continued pioneering in development of new uses for rubber will, I hope, add materially to gains recorded during the past twelve months. Referring specifically to the Goodrich company; in line with our established policy, laboratory facilities for both chemical and physical research are again being expanded, and additional trained personnel employed, to carry on what we consider a problem of basic importance—namely, not only pure research as related to rubber and allied materials, but for the testing and development of new products."

The Goodrich Silver Fleet, engaged in testing tires throughout the year, recently arrived in Florida, where it will conduct its winter operations. With headquarters in Orlando, the Silver Fleet will travel thousands of miles this winter. The south is chosen for winter operations because weather and road conditions allow an uninterrupted program of tire testing.

G. E. Brunner has been appointed assistant general sales manager of the original equipment tire division, reporting to T. A. Aspell, general sales manager of the division, according to President Tew. Mr. Brunner has been head of the national account sales department, including special account sales with the title of Manager, Factory Account Sales, for the last 15 months. After joining Goodrich in 1929, when the Miller Rubber Co. was united with Goodrich, Mr. Brunner became sales manager of the Miller tire division. He was placed in charge of special account sales in 1930. Mr. Brunner has had more than 20 years' experience in the sales end of the tire industry, entering the business after teaching two years following his graduation from Bates University.

J. D. Tew (*Left*) Presenting the Plaque to Edward N. Hines

Edward N. Hines, originator of the center traffic line in universal use for marking highways, was honored for this contribution to motoring safety at the annual banquet climaxing the thirty-fourth annual meeting of the American Automobile Association in Detroit, Mich., November 20. He was presented with a plaque commemorating his contribution by Mr. Tew, president of the Goodrich company, which some time ago launched a search throughout the country for the originator of the center traffic line idea. Mr. Hines has been a road commissioner for Wayne County more than 30 years and has originated many other highway safety ideas which have received general acceptance not only in his county but throughout the country as well.

Willis F. Avery

Patent Attorney

Willis F. Avery, assistant secretary of The B. F. Goodrich Co., Akron, in charge of patent, trade-mark, and copyright work, previously had been in charge of chemical and compounding cases in the company's legal department since joining it in 1924.

Born in Manchester, N. H., Mr. Avery received his education in the local public schools, at Brown University, the University in Maine, and the Washington, D. C., College of Law. For many years he was principal of Limington Academy, Limington, Me., where his work earned him inclusion in "Who's Who in New England."

Entering the United States Patent Office as assistant examiner in 1915, he handled applications for patents relating to power generators and miscellaneous power plants, classes including such important power mechanisms of our recent times as the electric refrigerator, mercury generator and turbine, the automobile torpedo, compound internal combustion engine, hydraulic transmissions, and liquid-air and solid-gas (dry ice) machines.

Mr. Avery was one of the organizers of the Patent Office Society and an officer in that organization from its founding until he left the government service. He was particularly active in securing the reclassification of technical positions in the government service.

After five years in the United States Patent Office, Mr. Avery was hired for the legal staff of the Westinghouse Electric & Mfg. Co. and was at its South Philadelphia plant for four years before going to Goodrich. He is a member of American Bar Association, Cleveland Patent Law Association, and a number of technical and fraternal organizations.

Enterprise Mfg. Co., manufacturer of fishing tackle, etc., Akron, on December 21 distributed a bonus to its 400 employes, amounting to 5% of their annual earnings.

(*Continued on page* 86)

MIDWEST

INDUSTRY and trade in the Midwest have been steadily gaining and remain well above the 1935 level. The manufacture of automobiles rose sharply, as output of new models was accelerated, but failed to equal the year-ago volume owing to postponed changeover in 1936 in certain makes of cars. November production exceeded 100,000 vehicles weekly. Interest is centered on the reception of new models at the automobile shows throughout the nation. Sales and attendance at these exhibits augur well for the 1937 selling season. Labor, with its strikes, though, is presenting a serious problem to the automobile industry. Building materials and construction work continue on the upgrade.

Crown Rubber Products Co., distributer of mechanical and industrial rubber products, recently moved to larger office and warehouse quarters at 609 N. Sixth St., Milwaukee, Wis. This change was necessary because of the increasing demand for more office space and ample warehousing facilities, and new quarters provide more than double the space of the firm's previous location.

A. Schrader's Son, Division of Scovill Mfg. Co., Inc., 470 Vanderbilt Ave., Brooklyn, N. Y., at the recent Chicago Automotive Service Industries Show was represented by a fine display booth in which several new products were featured. Attractive new standard packaging for all merchandise also was shown.

The Servus Rubber Co., Rock Island, Ill., manufacturer of rubber footwear, on December 2 announced through President Max Kalter a wage increase totaling $100,000, distributed among the company's 1,100 workers, effective January 1.

The Schacht Rubber Co., Huntington and Noblesville, both in Ind., contributed $7,000 worth of toys to the Noblesville Kiwanis Club. These toys were distributed to the poor children in Indiana. This donation was the largest single one for the needy youngsters that the Kiwanis of Indiana ever received.

St. Joseph Lead Co., 250 Park Ave., New York, N. Y., recently announced that it had restored wages and salaries to its 3,000 employes in its Southeastern Missouri division to the 1929 base rate. The increase, effective December 1, added about $500,000 to the company's payroll annually. Other divisions of the company, it was explained, have never been reduced so much as the Southeastern Missouri unit, and most of them already are back at the 1929 base rate. The company employs about 5,000 persons.

N. A. W. M. D. Convention

The 1937 convention committee of the National Association of Waste Material Dealers, Inc., Times Bldg., New York, N. Y., made up of a group of Chicago members, has announced that the convention will be featured by the operation throughout the convention period, March 15 to 17 inclusive, of the N. A. W. M. D. Club. The idea and the lines along which it will function will be entirely new in trade association activities and promises to afford to visiting members and the trade generally the greatest opportunity they have ever had for making new contacts and renewing old friendships.

The Sherman Hotel, Chicago, where the convention will be held, has set aside one of its large ballrooms for the exclusive use of the club, and practically all the members who have been in the habit of entertaining at the time of the convention plan to do so through the club during the coming convention.

The plans being worked out by the committee for the delegates and their wives are expected to call for a formal opening of the club on March 15, with entertainment; while on March 16 the committee will probably plan an informal dance for delegates and their wives. These functions will be held in the clubroom. The convention and entertainment committee has many other plans, particularly for entertaining visiting ladies.

The closing feature of the convention: namely, the twenty-fourth annual banquet of the association, will be held March 17 and because of the absolute certainty that the convention will be the largest in the history of the association, the committee has engaged the Grand Ballroom, seating well over 1,000 persons.

National Sporting Goods Association has changed the dates of its seventh annual convention and clinic to February 7, 8, and 9. The place is Hotel Congress, Chicago, Ill.

Gillette Rubber Co., Eau Claire, Wis., through R. W. Hutchens, president and general manager, has announced that all the new building operations for the firm's increased production schedule have been completed and the new machinery is being installed. This new daily schedule calls for 12,000 tires, 15,000 inner tubes, and 8,000 bicycle tires. Gillette has operated on a day and night shift basis since 1925 and has constantly increased its productive capacity since then. At present the factory is working six days a week, three eight-hour shifts in some departments and four six-hour shifts in other sections.

NEW JERSEY

WITH the approach of winter manufacturers are receiving more orders for rubber footwear. Manufacturers throughout the state report the best season in several years, with many having enough orders on hand to continue operating overtime during a good part of the winter. Some plants early in December announced that they would increase prices after January 1.

The rubber manufacturing concerns of Trenton contributed liberally toward the City's Community Chest drive inaugurated this year.

Jos. Stokes Rubber Co., Trenton, is having an addition and tower erected at its plant. The company continues to operate 24 hours a day at both its Trenton and Canadian plants.

Rubber Manufacturers' Association of New Jersey held its annual meeting and dinner December 8 at the Trenton Club, Trenton. A number of bankers were guests of the manufacturers. Following the dinner the following officers were reelected: president, John A. Lambert, Acme Rubber Mfg. Co.; vice president, Lloyd Leaver, Hamilton Rubber Mfg. Co.; secretary, Charles E. Stokes, Jr., Home Rubber Co.; treasurer, Horace B. Tobin, Woven Steel Hose & Rubber Co.

Acme Rubber Mfg. Co., Trenton, announced increased business in all departments, and officials expect a good winter trade.

Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, posted notices to its 3,000 employes that they would receive bonuses amounting to a week's pay for those employed before January 1, 1936, and a half week's pay for those hired the first six months of the year. The company plans a $100,000 plant addition.

Ruberoid Co., South Bound Brook, through its directors announced the adoption of a plan effective December 1, 1936, by which all wage earners in its factories not heretofore eligible to a vacation will be given a cash compensation. Next year the company will either grant an extra week's pay or one week's vacation with pay.

American Hard Rubber Co., Butler, will hold its third annual Hobby Show, January 29, 30, and 31, under the supervision of John L. Grider, employment supervisor and factory welfare director of the company. Prizes will be awarded all meritorious exhibits. The show, open to all residents of Butler and vicinity, will be held in the Tank Lining Building, to occupy the same space, considerably more than available last year, as is used for the company's annual flower shows. The Hobby Show is open to the public, under the usual arrangements of no entry fee for exhibitors or admission fee to visitors.

The Pequanoc Rubber Co., Butler, has announced earning increases, based on tonnage of rubber production, which amount from 3 to 15% over wages.

Luzerne Rubber Co., Trenton, reports increased output of hard rubber specialties. Sales Manager Harry E. Case is in demand as a public speaker and recently took part in a debate at the Junior High School in Trenton.

Puritan Rubber Co., Trenton, is booked with orders to continue operating overtime for several months. The company looks forward to increased prices at the beginning of 1937.

Pierce-Roberts Rubber Co., Trenton, having received many orders for druggists' sundries, has placed three shifts at work.

Mercer Rubber Co., Hamilton Square, is operating at capacity, with expectation of increased prices soon. William H. Sayen, company executive, recently returned from a western business trip, found conditions very satisfactory and prospects bright.

Titanium Pigment Corp., recently gave 500 employes at its Sayreville plant a cash bonus of 5% of their 1936 earnings, representing a payment of $40,000.

Whitehead Bros. Rubber Co., Trenton, is running 24 hours a day, with a decided increase in orders for rubber shoes.

"DuPrene" Now Neoprene

(*Continued from page* 58)

confused with chlorinated rubber. The firm then concluded that the only solution to the problem is to coin a new name, not derived from the name du Pont, which can be defined to mean either polymerized chloroprene or products made from it which display its distinctive characteristics. For this purpose the name Neoprene was adopted, and in order to promote its acceptance du Pont will discontinue featuring its trade mark "DuPrene" in favor of the generic name Neoprene.

The company does not intend to protect the name Neoprene as a trade mark. Du Pont is broadening its campaign of advertising to ultimate consumers and will feature the name Neoprene in all its 1937 advertising, with an explanatory note to the effect that it is the same product as was formerly sold under the trade mark "DuPrene." The firm believes it will be advantageous to its customers to tie their sales promotion efforts up with du Pont's by branding and advertising their products as Neoprene.

The grade of chloroprene polymer previously sold under the trade mark "DuPrene" and designated as Type E will hereafter be known as Neoprene Type E. The product itself has not been changed in any respect.

NEW ENGLAND

Franklin R. Hoadley

Farrel-Birmingham, Inc., Ansonia, Conn., announced that on January 1, 1937, Franklin R. Hoadley resigned as vice president to become president of the Atwood Machine Co., Stonington, Conn. Executives and employes of Farrel-Birmingham recently gave a testimonial dinner and presented Mr. Hoadley with a handsome desk set and a plaque commemorating 22 years of friendly associations. Since entering the employ of Farrel Foundry & Machine Co., upon graduating from Yale University in 1914, Mr. Hoadley became foundry manager in 1919 and a director in 1923. In 1930 he was elected vice president and a member of the executive committee of the new Farrel-Birmingham Co., Inc., which had been formed in 1927. Being an eager student of the problem of unemployment, Mr. Hoadley has been active in trade associations. As an advocate for industrial preparedness for war, he is a lieutenant colonel in the United States Ordnance Reserve and was assigned as chief of manufacture in the Hartford Ordnance District.

Naugatuck Chemical. Nine truck drivers, transporting acids, caustics, compressed gas, and other chemical products, have operated their trucks without an accident of any kind, in 225,000 truck miles from November 1, 1935, to November 1, 1936. In recognition of this record for safe driving, John E. Caskey, plant manager at Naugatuck Chemical, Naugatuck, Conn., presented badges and certificates of merit to William Birdsall, Leon Clark, Daniel Coleman, John Galvin, John Pond, Robert Raynor, Harold Trestrail, Tracy White, and Allison Wurtenberg. One accident, although of an unavoidable nature, deprived August Zonghetti from receiving the award although he drove the acid tank truck 35,700 miles during the year.

The H. O. Canfield Co., 191 Housatonic Ave., Bridgeport, Conn., which employs about 400 workers making rubber goods, during Christmas week gave a bonus of one week's pay to all its help with the company since November 1. A pay rise, effective January 1, also was announced, to consist of a 5% increase on all rates throughout the factory.

The Stanley Chemical Co., East Berlin, Conn., at a meeting of stockholders and directors on November 23, elected W. J. Kerin president and treasurer, succeeding the late Wm. S. Rowland as president. E. M. Hayden was named vice president and secretary, and Edw. H. Christ, vice president and sales manager. These officers together with C. F. Bennett, E. A. Moore, R. E. Pritchard, E. W. Christ, and J. E. Cooper comprise the board of directors. Mr. Kerin came to the company from The Stanley Works on January 1, 1919, and for many years has been treasurer. Mr. Hayden, in charge of the technical development and research, has been with the company since 1919, and Mr. Christ has been sales manager since he became a member of the organization in 1926.

The Stamford Rubber Supply Co., manufacturer of Factice since 1900, Stamford, Conn., is adding a small addition to its present plant.

The Scovill Mfg. Co., Inc., Waterbury, Conn., on December 14 announced a 5% wage increase for the more than 6,500 employes of the concern and its subsidiaries. The increase, following a 5% advance made last September 6, affects employes in Waterbury and at A. Schrader's Son, Brooklyn, N. Y., and the Hamilton-Beach Co., Racine, Wis.

Coordinated Control System

(*Continued from page* 60)

quality, processes that give trouble because their schedule of operation is such that operators find it difficult to follow them manually.

The exact formula, sequence of operation, or control point of each factor affecting the quality of product and yield, recommended by the designer of a process can be built into the coordinated control system, which will carry out each step and control each factor with split-degree accuracy.

The "mechanical brain" coordinates the efforts of the instruments and automatically regulates all the operations in the process. It is in effect the pace maker or monitor that regulates all operations, causing them to take place in proper sequence and run for a scheduled time. The Bristol Co., Waterbury, Conn.

Rubber Industry in Europe

GREAT BRITAIN

Latex Paste Container

A newly invented paste container and pasting device, marketed by Bateman's, 19 British Grove, Chiswick, London W.4., is specially designed to permit the use of latex as adhesive. It was felt that with its undoubtedly superior properties latex would find a widespread use as a paste once it was suitably put up. The new container is entirely of rubber, the collar of which can be pressed down to allow the contents to exude. Then the specially shaped glass spreader, which is also the stopper for the container, is inserted and just enough latex is picked up for the purpose required and spread without soiling the hands. Smooth glass, it seems, permits efficient and economical spreading of the latex. The new container is so constructed that the contents can be emptied to the last few drops.

Rubber Paving

Among the questions that arise now that the price of crude rubber has been steadily gaining and bids fair to remain at a considerably higher level than experienced for some years is whether the manufacture of many of the newer uses of rubber encouraged by the prolonged period of low prices will be noticeably curtailed. Again, will the work on rubber paving blocks undergo any marked setback, or will the process of manufacture have to be modified as a consequence of higher prices?

These queries were called forth by illustrations of recent rubber pavings in England shown in the *Bulletin of the Rubber Growers' Association.* Illustrated is the area in New Bridge St., London, that had first been paved with Gaisman cream-colored rubber blocks in October, 1926. The traffic here is very heavy: in July, 1927, census returns stated that it was 48,398 tons a day, and this figure has undoubtedly increased considerably since. A section of this area covering 200 square yards was ripped up in 1932 and replaced with improved smooth black blocks, also manufactured by Universal Rubber Paviours, Ltd. In 1936 the remaining 500 square yards were taken up and relaid with the latest development of the Gaisman block, one having a bramble, non-skid surface. Incidentally, Universal Rubber Paviours, Ltd., recently bought and equipped a factory at Stockport to manufacture rubber paving blocks.

Also shown in the *Bulletin* is a section in Finsbury, recently paved with rubber paving blocks designed and manufactured by Pirelli, Ltd., Burton-on-Trent. These blocks are 12 by eight inches and about two inches thick. The surfaces are grooved, and the underside of the cap is recessed to provide a key for the concrete bed. The blocks are set so that the grooves lie diagonally to the lines of traffic. Judging from the details of the description and the illustrations, these blocks are very similar to, if not the same as, some that were laid in an experiment in Milan, Italy, in 1933.[1]

A white line of rubber composition blocks is being laid one mile between Harwood and Harrogate to take the place of the painted white line. The latter had to be repainted every month.

[1] See India Rubber World, Aug. 1, 1934, p. 56.

Notes

The use of Dunlopillo for upholstering seats in buses and street cars is spreading rapidly to all parts of England. Recently Dunlop received more orders to equip 588 double-deck and single-deck buses and street cars for service in places as far apart as London and Leeds, Lincolnshire, and South Wales.

The British Rubber Reclaiming Co., Ltd., recently formed and capitalized at £3,000, has made an agreement with George Wattelez and is to carry on the business of merchants and dealers in rubber, rubber waste, substitute, etc.

The British Tire & Rubber Co., Ltd., declared a final dividend of 4½% on the ordinary share capital, bringing the total dividend for the year ending September 30, 1936, to 8%, the same as in the preceding year. The cash bonus, however, was 2% against 1½% the year before.

To help the home manufacture of rubber aprons a specific duty of 2s. per dozen has been imposed on imported aprons and overalls as an alternative to the existing duty of 20% ad valorem. The new rate became effective November 24, 1936.

Higher cost of production and the rising prices of commodities have obliged the Leyland & Birmingham Rubber Co., Ltd., to increase prices on all surgical rubber goods by 10%.

Glossy black helmets of cork and rubber gradually will replace the present shiny brass headgear of London firemen.

GERMANY

Hofmann and Synthetic Rubber

On November 2, 1936, Prof. Fritz Hofmann, well known for his work in connection with synthetic rubber, celebrated his seventieth birthday. Professor Hofmann was born in Kolleda, Thuringia, and soon after taking his degree in pharmacy and chemistry, joined the Elberfelder Farbenfabriken vorm. Friedrich Bayer, now the I. G. Farbenindustrie, a connection which lasted from 1897 to 1918. Following up the observations of the French investigator, Bouchardat, who was the first to recognize in isoprene the basis of rubber, Hofmann, as early as 1906, together with collaborators, solved the problem of producing isoprene and later on produced a whole series of butadienes. In the Fall of 1909 he succeeded in making rubber by heating isoprene and subsequently developed methods of polymerizing butadiene, thus paving the way for research work that has now culminated in the perfection of Buna.

As Dr. Konrad points out in his article on synthetic rubber in Germany, in the jubilee issue of *Gummi-Zeitung*, not the least important results of Hofmann's work on synthetic rubber was the discovery of accelerators and antiagers. For during the war, when synthetic rubber had to be used in Germany, it was found necessary to discover means to protect the new rubbers from the rapid deterioration to which they were prone and to accelerate their very slow rate of cure. So that although accelerators were first used in secret processes in America, Germany must receive due credit for the independent discovery of these agents, for developing them and making them available to the industry in general.

For his work on synthetic rubber Professor Hofmann was awarded the Emil Fischer gold medal in 1912 by the Association of German Chemists. Professor Hofmann devoted himself to the problem of synthetic rubber up to 1918 when he became director of the Silesian Coal Research Institute of the Kaiser-Wilhelm Society in Breslau, with which institution he is still connected. For some years now he has given more and more of his time to pharmaceutical research and has in fact collaborated in the perfection of various pharmaceutical preparations. At present he is particularly interested in helping to find a remedy for cancer, a task to which he intends to give the remaining

years of his life. In recognition of his scientific achievements not only his birthplace, Kolleda, but also Breslau, gave him the freedom of the city.

New Elastic Fabrics

Germany, long prominent in the production of square rubber thread, has also been turning to the manufacture of latex thread. At present two distinct types are put out, round latex thread known as Rontex, and grooved latex thread known as Quartex. The latter is preferred where greater adhesion of the elastic material in the woven or knit goods is desirable. The latex thread is available not only in the natural color, but also colored white or red. Among the corset materials now in vogue may be mentioned the open-mesh fabric with two-way stretch and a rather novel material which stretches only in one direction. In the latter the rubber thread covered with lustrous artificial silk is worked into the matt-surfaced knitted fabric at intervals of about ½ to 1 cm. to give a quilted effect; while the plain non-elastic material between the stitching has silk-bound perforations at regular intervals producing a definite pattern. A similar method has been followed to make edgings one to three cm. wide, intended for ladies' knitted undergarments; the openwork in this case is more elaborate.

Continental's New Ventures

The Continental Gummi-Werke, A.G., is setting aside approximately 12,500,000 marks for new construction in 1937. In 1936 the firm spent 7,000,000 marks for similar purposes. It is planned not only to extend the present reclaim works of the concern, but also to erect special buildings where German synthetic rubber will be worked up and to participate in producing domestic carbon black at the works soon to be erected.

RUSSIA

During the first half of 1936 output at the rubber factory Krasnie Treugolnik was 99.7% of the amount which should have been manufactured according to the program for this period. The small difference as against the planned output was caused during the first quarter of the year and was chiefly due to hitches in the supplying of materials to the factory. Compared with the first half of 1935, however, there was an increase; the output in that period represented a value of 208,123,200 rubles against 227,127,800 rubles in 1936.

The use of reclaim during the period under review also fell below the amount scheduled, 8,300 instead of 9,100 tons; nevertheless there was an increase as compared with 7,798 tons used in the first half of 1935. In line with the program there has been a considerable increase of late in the percentage of reclaim used in various types of goods, and in the case of footwear, soles, and certain technical goods, the proportion of reclaim is now much larger than that of fresh rubber, although in the earlier months of the year the proportion of reclaim to fresh rubber in these goods had averaged about 50:50.

The development in the use of synthetic rubber is also marked. Whereas in 1933 an average of only 3.8% of synthetic rubber was successfully incorporated in rubber compounds, this percentage increased to 17.1 in 1934, to 36.9 in 1935, and in June, 1936, to 58.9. According to the plan for 1936, 41.3% should have been used over the first quarter of 1936 and 56.4% over the second. Actually Treugolnik has now changed over to synthetic rubber in the manufacture of a number of articles, including inner tubes, certain truck tires, molded galoshes, hose, ebonite battery jars, pressed soles, cycle pedals, rubberized cloth, accessories for sugar factories, pressed sheet for technical purposes, aprons, and various technical and electrical goods. The firm expects in a short time to manufacture all auto covers entirely of synthetic rubber.

From this report it is evident that considerable headway is being made in increasing output, but it is frankly admitted that the quality still leaves much to be desired, and the proportion of defective goods is too large, despite all efforts at improvement. This condition appears due to the poor and extremely variable quality of the basic raw materials entering the factory. A considerable proportion of the chemicals, for instance, is always below standard; thus in the first quarter of 1936, 100% of the zinc white was below standard, in May, 1936, however, only 6.1%; 39% of the sulphur was below standard in the first quarter of 1936, 72.4% in April, and 23.6% in May. This necessitates constant changing of formulas; in January, 1936, for example, 46% of the formulas had to be changed, in February 97%, March 61%, and May 82%. Of course, unceasing efforts are made to improve this condition.

DENMARK

Denmark's total imports of crude and manufactured rubber declined in the first half of 1936. The only important single item which showed an increase was cycle tire covers, from 1,755 to 1,801 quintals. Crude rubber imports were 10,049 against 13,810 quintals; automobile tires, 10,110 against 11,655 quintals; cycle tubes, 474 against 547 quintals; automobile and motor cycle tubes, 637 against 678 quintals; hose, 464 against 904 quintals; other rubber goods, 4,183 against 5,119 quintals.

The rubber manufacturing firm, Schionning & Arve, Copenhagen, reported net profits of 573,107 kroner and distributed a 10% dividend, compared with the preceding one of 9%.

POLAND

While Poland's rubber exports, including footwear, continue to decline and in the third quarter of 1936 came to only 47 tons, value 171,000 zloty, against 93 tons, value 333,000 zloty, in the same period of 1935, crude rubber imports increased from 3,062 to 3,602 tons. This rise is almost wholly due to the growing motorization of the country and the consequent rise in the manufacture of tires. Despite this trend, tire imports rose from 704 tons in the third quarter of 1935 to 758 tons in 1936.

OBITUARY

(*Continued from page* 62)

Elizabeth, N. J. He left this post in June, 1919, to join the patent department of U. S. Rubber.

Mr. Pipes belonged to the American Patent Law Association, Phi Sigma Kappa, and Suburban Golf Club, Union, N. J.

The deceased leaves his wife, a daughter, a sister, and two brothers.

Funeral services were held on December 16.

P. B. Ermeling

PHILIP B. ERMELING, 44, an accountant at the Essex Rubber Co., Trenton, N. J., died November 25 after a two-week illness. He was a Mason. Surviving are his wife, a daughter, and his mother. Burial was in Ewing Cemetery, Trenton.

Edward S. Pierce

EDWARD S. PIERCE, 65, of Medford, Mass., one of the pioneers of the advertising profession in New England, died November 29 after a brief illness. As one time advertising manager for the agency of J. Walter Thompson, Mr. Pierce was largely responsible for the development of the O'Sullivan rubber heel business.

FINANCIAL

(*Continued from page* 66)

net profit, $18,426, equal to $2.10 a share on 8,784 shares of $50-par 7% preferred shares, excluding treasury stock on which undeclared cumulative dividends in arrears amounted to $3.87 a share. In the preceding year there was a net loss of $49,918.

The Thermoid Co., Trenton, N. J., announced recently that it had filed a registration statement with the Securities and Exchange Commission in Washington covering the issuance of $2,450,000 of first-lien collateral trust 5% bonds, with stock-purchase warrants. The bonds, dated December 15, 1936, will mature on December 15, 1951. Each $1,000 bond will carry three nondetachable stock-purchase warrants for ten shares of common stock.

Rubber Industry in Far East

MALAYA

The Cockshafer Menace

The planting correspondent of the *Straits Times* calls attention to the menace of the cockchafer grub in Malaya. Quoting from the annual reports of the Rubber Research Institute of Malaya for the years 1932 to 1935, the writer shows that this pest was first reported in 1931 on an estate in Perak and that it has slowly but steadily spread from year to year. The 1935 report stated that six new widely scattered areas were attacked, that no serious damage was done to the rubber, but natural covers were destroyed by the grubs of the pest feeding on the roots of the plants, and that no economic methods of eradication have as yet been discovered.

In September, 1936, the author visited some estates where conditions led him to the conclusion that the danger of the pest was not fully appreciated and that immediate action was necessary. He states that he toured a district where four years ago only one estate was infected and that on an area of not more than one acre. Today seven estates report the pest on areas totaling hundreds of acres, and the damage done is such that the managers agree that immediate and strong measures are needed to prevent the development of what may become a serious menace to the rubber growing industry in the country.

The cockchafer has a life cycle of one year and resembles an ordinary brown beetle. It lays its white eggs in clusters in the soil at a depth of one foot below the surface. The damage is done by the grubs which develop from the eggs in about 14 days and become very active, attacking the roots of plants around them so that forestry growths assume a withered flattened look. They have also been found to feed on the roots of older rubber and also of budded rubber. The author tells of young rubber in which the whole circumference of the taproot had been ring-barked; while the younger lateral roots had been eaten off to almost the base of the tree. Although the older trees undoubtedly will develop new feeding roots, the damage nevertheless renders them especially susceptible to attacks of other insect pests and to diseases, particularly root diseases.

Present experience appears to indicate that the spread of the infection is limited by the fact that the grub does not travel underground more than about 30 feet from the hatching nest; while the flight of the beetles is believed not to exceed a radius of one mile. But beetles could be carried to considerable distances from infected areas along railway lines or main roads. It has been suggested that forestry may be responsible for the development of this pest, as food is provided that would not otherwise be obtainable. But there is evidence of the presence of the cockchafer also on clean-weeded estates.

Considering the spread of the pest and the potential danger, together with the fact that no economic method of eradication has as yet been found by the Rubber Research Institute, the author suggests that the latter body take immediate action to have the presence of the pest on estates made notifiable and that an officer should be appointed especially to conduct investigations and to search for a suitable remedy to overcome this trouble.

I. S. P. Conference

The Incorporated Society of Planters held its twelfth annual conference at Kuala Lumpur, October 2 to 4, 1936. Numbers of planters from all parts of Malaya were present in addition to various high officials. The conference was opened by the High Commissioner of the Federated Malay States, Sir Shenton Thomas, who began his speech by welcoming H. J. Page, the new director of the Rubber Research Institute of Malaya. He praised the services rendered the rubber industry by the I.S.P. in the seventeen years of its existence. Two points that Sir Shenton Thomas stressed were the importance of cheap production and the need of the best type of employe, who, however, should receive proper remuneration, for as he put it, "Cheap labor is very often bad labor."

Also on the program were several lectures of interest to the rubber industry. In "The Tapping of Budded Trees," C. E. T. Mann showed how budded trees differed from seedlings in regard to shape of trunk, thickness of bark, and yields at different tapping heights and pointed out where and why methods of tapping required modifications when applied to buddings.

Dr. K. C. Roberts spoke on the "Composition of Latex." In the June, 1936, issue of the *Journal of the Rubber Research Institute of Malaya* he already discussed the method of isolating the different substances in latex; in the conference lecture he confined himself to enumerating and describing the various components. They are given in the following table:

	Latex	% of Total Solids
Water	60.0	....
Ammonium Salt, Ester	0.1	0.25
Fatty Acid Complex	0.5	1.25
Phosphate Complex	2.0	5.00
Sulphur Complex	1.4	3.50
Protein	0.8	2.00
Rubber Hydrocarbon	35.2	88.00
	100.0	100.00

The rubber hydrocarbon, he emphasized, although it comprises nearly 90% of the dry matter of latex, is essentially not rubbery at all. The characteristic properties known as rubberiness are the result of the presence of other substances, particularly the sulphur complex and the phosphate complex, included in the so-called non-caoutchouc fraction. Dr. Roberts believes this fact makes it certain that no artificially produced hydrocarbon or similar substance will ever be identical with the natural one. On the other hand, he says, there are distinct indications of the possibility of modifying the natural product to give it the advantages now claimed for the various synthetic rubbers.

CEYLON

To be fully prepared when the renewal of the present restriction scheme comes up for consideration in April or June, 1938, Ceylon is taking steps to have ready complete statistical data on rubber estates. The verification of assessments of estates, especially of small holdings of less than 10 acres, is accordingly to be speeded up, a big task when it is considered that there are 100,000 small holdings. To facilitate this work 38 additional inspectors have been appointed, and to provide funds for salaries and allowances of these officers the cess on rubber is to be raised from 25 rupee cents per 100 pounds to 30 cents.

During the first nine months of 1936, Ceylon exported 78,138,128 pounds of rubber, compared with 86,236,168 pounds in the corresponding period of 1935.

BURMA

The International Rubber Regulation Committee has fixed the quota of Burma at 9,000 tons for 1937.

NETHERLAND INDIA

Arniet Latex Utensils

In preparing crude rubber the material of which the utensils that come in contact with the latex—as coagulation tanks, partitions, strainers, etc.—are made is of the utmost importance. Not only must the utensils be able to stand a certain amount of rough handling, but they must also be resistant to acid, and finally the price must be reasonable. To a certain extent aluminum has been found to answer these requirements, and aluminum articles are finding increasing demand for estate use.

Algemeen Landbouwweekblad stated Rubber Cultuur Mij. Amsterdam, which has extensive estates in East Coast Sumatra, has been striking out in a new direction. After the slump in rubber prices this firm in 1932 began to use ebonite for coagulating apparatus and after much experimentation established a factory where partitions for coagulating tanks and even the tanks were manufactured from a special hard rubber compound known as Arniet.

Tests have shown that whereas aluminum is more or less attacked by different acids so that coagulation with the otherwise satisfactory and cheap coagulant sodium silico-fluoride, for instance, is impossible where appliances are made of aluminum, Arniet in every case showed perfect resistance. Again, aluminum partitions become somewhat dull and roughened in use, tending to cause the coagulum to stick to them; but Arniet surfaces are quite smooth and stay smooth, and once they have been thoroughly scrubbed to remove the greasy layer with which new Arniet is covered in course of manufacture, the coagulum never adheres to them. They are, therefore, easier to handle and to clean. While Arniet becomes soft and pliable when subjected to temperatures over 60° C., this condition causes no difficulty, as these temperatures do not come in for consideration in normal factory practice.

The new material is gaining favor in East Coast Sumatra where already more than 20,000 Arniet partitions are used; while the Rubber Cultuur Mij. Amsterdam itself has more than 200 coagulating tanks in daily use. The partitions are obtainable in different sizes up to a maximum of 80 by 50 cm. and from 3 to 15 mm. thick. The tanks are of any length desired and with any number of grooves for the partitions, but cannot be supplied in widths exceeding 78 cm., or depths over 50 cm. The Arniet is black, and as the tanks are held in metal frames painted silver grey with acidproof paint, they are attractive in appearance. Besides tanks and partitions the firm also makes stirrers for sheet tanks, latex strainers of Arniet with nickel gauze, covers for laboratory tables, tanks for holding formic acid, latex guides, coagulum chutes, etc.

For Arniet wares it is claimed that they not only resist acid perfectly and have good mechanical resistance, but they are cheaper than similar aluminum articles.

New Taxation

The government has decided to levy an extra export duty of 2% on a number of products, including rubber. While recognizing objections to additional taxation at present, the government is obliged to take this course as the budgetary situation has developed more unfavorably than expected. Considerable sums have been voted for national defense, and revenues will be curtailed by the reduction in the price of salt and the import duties. The new duty, effective the end of November, 1936, will be in force 15 months. It is levied on estate rubber and on native rubber from districts having individual restriction. When individual restriction is applied to all native rubber, the 20% duty will be payable also by those at present paying the special export duty. Besides this special export duty, which has been raised to 57 guilders per hundred kilos, all native rubber is subject to a regular export duty of 5% which has been long in force and was imposed because the natives could not be sufficiently reached by the income tax. At first the government proposed to double this last duty when individual restriction is introduced and the special duty is abolished, but this proposal was rejected by the Volksraad (People's Council), and now the government announces that in view of the universal 2% tax it will abide by the decision of the council.

Statistical

Rubber exports from Netherland India during September, 1936, totaled 22,192,326 kilos dry, against 25,710,636 kilos in August. Of this, 4,610,960 kilos came from Java and Madura and included 7,025 kilos of latex; estates in the Outer Provinces sent 7,636,206 kilos, including 893,843 kilos latex; while native rubber came to 9,937,842 kilos.

Provisional figures for October, 1936, place the total exports at 27,810,135 kilos. Java and Madura accounted for 6,647,706 kilos; estates in Outer Provinces for 9,219,226 kilos including 926,908 kilos latex, and native rubber for 11,943,203 kilos. Java also shipped 7,318 kilos of tires in September and 23,651 kilos of rubber manfactures in October, 1936.

Imports of automobiles increased to 3,374 metric tons, value 2,645,000 guilders, in the first half of 1936, against 2,469 tons, value 1,999,000 guilders, in the same period of 1935; trucks rose from 981 tons, value 552,000 guilders to 1,069 tons, value 624,000 guilders. At the same time tires dropped from 1,017 metric tons, value 955,000 guilders, to 468 tons, value 308,000 guilders, and inner tubes from 110 tons, value 107,000 guilders, to 33 tons, value 34,000 guilders.

Native Rubber Control

On December 22 came word from Zuitenzorg, Java, that an ordinance was issued making effective the introduction of individual restriction from January 1, 1937, for native rubber in those regions where a special duty is still levied.

JAPAN

Japan, which is showing so much enterprise in the rubber business, is not lagging behind in the matter of synthetic rubber. Several leading rubber and cable companies have been working on this problem. According to press reports, the Sumitomo Electric Wire Works has progressed furthest in this direction. This concern, developing the synthetic for some years, has now reached the stage where it can put the material out in commercial quantities. Recently it is said to have erected a factory with a daily capacity of 30 tons of synthetic rubber obtained by a process that differs substantially from those followed in Europe and America. The Japan Motor Car & Airplane Tire Co., Osaka, is credited with producing synthetic rubber on an experimental scale; while the Toyo Chisso Rubber Co. is said to be attempting to make rubber from calcium chloride. The Nippon Saisei Gomu Kogyo has raised its capital from 200,000 to 500,000 yen, also with the intention of manufacturing synthetic rubber.

Japanese rubber goods exports again declined during the first nine months of 1936, when they represented a value of 31,372,897 yen against 32,814,646 yen in 1935. The chief losses were sustained in footwear, cycle tires and tubes, and sporting goods. Shipments of hose and belting were about 45% higher than in the corresponding period of 1935. Increases were also noted in toys, 9%; other rubber goods, 7.6%; automobile tires and tubes, and tires for rikishas. Yet all these gains were not enough to offset entirely the losses mentioned above.

"Dayton Cog Belt Drives and V-Flat Drives." The Dayton Rubber Mfg. Co., Dayton, O. In this catalog, No. 180, the construction is shown of several V-belt specialties, together with voluminous data and applications of the belts in industrial service.

Patents and Trade Marks

MACHINERY

United States

2,057,973. **Tire Repair Jig.** E. C. Plank, Pasadena, Calif.

2,058,032. **Rubber Thread Former.** E. A. Murphy, assignor to Dunlop Rubber Co., Ltd., Birmingham, England.

2,058,100. **Tire Casing Spreader.** W. H. Peaden, W. H. Horster, and A. O'Dell, all of Tulsa, Okla., assignors to Tire Tools, Inc., a corporation of Okla.

2,058,201. **Golf Ball Tester.** P. E. Young, Fairhaven, Mass., assignor to Acushnet Process Co., a corporation of Mass.

2,058,211. **Chronoscope.** R. W. Brown, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,058,233. **Vulcanizer.** C. Iverson, assignor to National Rubber Machinery Co., both of Akron, O.

2,058,243. **Rubber Cylinder Builder.** W. A. Lippincott, Oak Park, and D. W. Campbell, Chicago, assignors to Ideal Roller & Mfg. Co., Chicago, all in Ill.

2,058,395. **Golf Ball Mold Design Cutter.** R. Atti, Union City, N. J.

2,058,446. **Shoe Sole Cementer.** H. Haselier, Garfield, N. J., assignor to Barge Electric Shoe Cement Press, Inc., Brooklyn, N. Y.

2,058,491. **Temperature Indicator.** A. Noble, Naugatuck, assignor to Bristol Co., Waterbury, both in Conn.

2,058,518. **Thickness Measurer.** P. B. Schuster, assignor to Magnetic Gauge Co., both of Akron, O.

2,058,552. **Dipped Rubber Article Form.** H. Becher and J. Stein, both of New York, N. Y.; said Becher assignor to said Stein.

2,058,758. **Strand Handler.** G. A. Barber, Kent, O., assignor to Wingfoot Corp., Wilmington, Del.

2,058,784. **Balancer.** H. B. Gibbons and R. C. Hoff, both of Akron, O., assignors to Wingfoot Corp., Wilmington, Del.

2,058,805. **Nonskid Tire Demonstrator.** W. J. Lee, Cuyahoga Falls, O., assignor to Wingfoot Corp., Wilmington, Del.

2,058,880. **Embosser.** R. R. Hunt, assignor to Mishawaka Rubber & Woolen Mfg. Co., both of Mishawaka, Ind.

2,059,324. **Safety Device.** J. T. Emslie, Arlington, N. J., assignor, by mesne assignments, to E. I. du Pont de Nemours & Co., Wilmington, Del.

2,059,387. **Brake Lining Apparatus.** W. Nanfeldt, Clifton, assignor to World Bestos Corp., Paterson, both in N. J.

2,059,831. **Shoe Press.** E. A. Willey, assignor to Converse Rubber Co., both of Malden, Mass.

2,059,883. **Vulcanizer.** C. Macbeth, Birmingham, England.

2,060,061. **Sole Layer.** S. J. Finn, Beverly, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.

2,060,193. **Label Applier.** H. R. Gilson, Groton, Mass., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.

2,060,269. **Fabric Winder.** G. F. Wikle, Detroit, Mich., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.

2,060,380. **Winder.** A. F. Pym, Beach Bluff, assignor to Sibley-Pym Corp., Lynn, both in Mass.

Dominion of Canada

361,278. **Rubber Article Form.** International Latex Corp., Rochester, N. Y., assignee of J. R. Gammeter, Akron, O., both in the U. S. A.

361,320. **Rubber Article Apparatus.** A. N. Spanel, Rochester, N. Y., U. S. A.

361,421. **Tire Building Form.** Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton, Ont., assignee of H. D. Stevens and R. W. Allen, co-inventors, both of Akron, O., U. S. A.

361,422. **Tire Builder.** Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton, Ont., assignee of H. D. Stevens, Akron, O., U. S. A.

361,434. **Adhesive Applier.** Pharis Tire & Rubber Co., assignee of J. E. Warrell, both of Newark, O., U. S. A.

361,468. **Carbon Black Producer.** F. C. Reed, Kansas City, Mo., U. S. A.

361,540. **Patch Maker.** Gillette Rubber Co., assignee of A. R. Krause, H. O. Hutchens, J. F. Cullen, and A. C. Hirsch, co-inventors, all of Eau Claire, Wis., U. S. A.

361,556. **Tire Retreader.** Pharis Tire & Rubber Co., assignee of H. Y. Houlette, both of Newark, O., U. S. A.

361,774. **Electric Vulcanizer.** R. Dupont, Epernay, France.

United Kingdom

447,227. **Elastic Thread Apparatus.** S. W. Alderfer, Akron, O., U. S. A.

448,971. **Electric Heater.** L. J. Clayton, Toronto, Ont., Canada.

449,062. **Jewelry Mold.** T. G. Jungersen, Mimico, Ont., Canada.

449,198. **Vulcanizer Time Switch.** Dental Mfg. Co., Ltd., and F. T. Williams, both of London.

449,297. **Bathing Cap Form.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands.

449,376. **Vulcanizer.** R. Dupont, Epernay, France.

449,625. **Electric Conduit Apparatus.** Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa., assignee of C. W. Abbott, Larchmont, N. Y., both in the U. S. A.

PROCESS

United States

2,057,733. **Rubber Bonded Abrasive Article.** R. J. Noble, Malden, assignor to Heveatex Corp., Melrose, both in Mass.

2,057,789. **Spun Tubular Hose.** A Petersen, Quincy, assignor to Armored Tube Co., Malden, both in Mass.

2,058,031. **Surface Finished Article.** E. A. Murphy, assignor to Dunlop Rubber Co., Ltd., Birmingham, England.

2,058,165. **Protecting Fabricated Springs.** C. F. McCoy, Pennington, assignor to Trenton Spring Products Co., Trenton, both in N. J.

2,058,443. **Shoe.** J. B. Hadaway, Swampscott, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.

2,058,865. **Bonding Rubber and Metal.** T. R. Griffith, assignor to R. J. Reaney, both of Ottawa, Canada.

2,058,954. **Impregnating Cord Fabric.** W. Coverly, Sandwich, Ont., Canada.

2,059,278. **Sponge Rubber Article.** W. S. Robinson, La Porte, Ind., assignor to E. I. du Pont de Nemours & Co., Wilmington, Del.

2,059,284. **Rubber Manufacture.** J. W. Schade, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,060,041. **Decorative Sheet Material.** E. A. Corbin, Jr., Gradyville, and E. W. Wolf, Philadelphia, assignors of 1/3 to W. C. Biddle, Lansdowne, all in Pa.

2,060,120. **Battery Box.** W. F. Ray, assignor, by mesne assignments, to Rubberized Metal Containers, Inc., both of Chicago, Ill.

2,060,342. and 2,060,343. **Coated Fabric Article.** R. C. Palicki, Toledo, O.

2,060,461. **Bubble Chewing Gum.** R. P. Dyckman, Orange, N. J., assignor to L. A. Dreyfus Co., a corporation of N. Y.

2,060,576. **Marked Rubber Goods.** W. L. Kauffman, 2d, assignor to Lovell Mfg. Co., both of Erie, Pa.

Dominion of Canada

361,250. **Fire Lighter.** Inter-Empire Agencies, Ltd., Montreal, P. Q., assignee of Rubylite, Ltd., Exmouth, assignee of G. N. Thomson, Exmouth, and C. K. Bamber, London, co-inventors, all in England.

361,569. **Inner Tube.** Wingfoot Corp., Wilmington, Del., assignee of B. C. Eberhard, Akron, O., both in the U. S. A.

361,571. **Tire Fabric.** Wingfoot Corp., Wilmington, Del., assignee of G. D. Mallory, Akron, O., U. S. A.

United Kingdom

447,729. **Gas Mask.** Hungarian Rubber Goods Factory, Ltd., and C. Ehrmann, both of Budapest, Hungary.

448,430. **Ear Plug.** J. P. Hershman, Nottingham.

448,669. **Elastic Fabric.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands.

448,855. **Compound Sheet Material.** J. S. Wheelwright, Ltd., London, and J. S. Wheelwright, Tonbridge.

449,000. **Sealing Cans.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands.

449,131. **Overshoe.** J. De Noronha, Rio de Janeiro, Brazil.

449,158 **Rubber Thread.** T. L. Shepherd, London.

449,223. **Compound Sheet Material.** Thuringische Glaswoll - Industrie Vorm. S. Koch Ges., Hamburg, Germany.

449,252. **Elastic Stocking.** F. B. Dehn, London. (Berkshire Knitting Mills, Wyoming, Pa., U. S. A.)
449,301. **Molding Hollow Articles.** K. Bratring, Luckenwalde, Germany.
449,314 and 449,462. **Rubber Thread.** T. L. Shepherd, London.
449,588. **Tire Fabric.** Cela Holding Soc. Anon., Luxemburg, Luxemburg.
449,737. **Cable Joint.** Okonite Co., Passaic, and R. C. Waldron, Nutley, both in N. J., U. S. A.
449,782. **Uniting Metal Foil and Paper.** Aluminumwerk Tscheulin Ges., and K. Craemer, Teningen, Germany.
449,788. **Wall Panel.** W. Lampferhoff, Brussels, Belgium.
449,941. **Tire Fabric.** Wingfoot Corp., Wilmington, Del., U. S. A.

Germany

638,036. **Hard Rubber Goods.** J. R. Geigy A.G., Basle, Switzerland. Represented by A. Kring.
638,226. **Decorated Hollow Balls.** Hessische Gummiwaren-Fabrik Fritz Peter A.G., Klein-Auheim a.M.
638,227. **Colored Hollow Goods with Relief Decorations.** Hessische Gummiwaren-Fabrik Fritz Peter A.G., Klein-Auheim a.M.
638,345. **Vulcanizing Process.** Dunlop Rubber Co., Ltd., London, England. Represented by C. and E. Weigand, Berlin.

CHEMICAL

United States

2,057,715. **Coating Composition.** H. L. Fisher, Leonia, N. J., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.
2,057,717. **Treating Rubber Surfaces.** R. H. Gerke, Nutley, N. J., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.
2,057,999. **Chlorinated Rubber Composition.** W. D. Bowlby, assignor to Hercules Powder Co., both of Wilmington, Del.
2,058,222. **Rubber Color.** E. Fischer, Offenbach a. M., Germany, assignor to General Aniline Works, Inc., New York, N. Y.
2,058,246. **Bonding Rubber to Metal.** W. J. McCortney, Royal Oak, assignor to Chrysler Corp., Detroit, both in Mich.
2,058,247. **Chemically Creaming Latex.** J. McGavack, Leonia, N. J., assignor to United States Rubber Co., New York, N. Y.
2,058,547. **Accelerator.** H. Adkins, Madison, Wis., and H. I. Cramer, Cuyahoga Falls, O.
2,058,615. **Age Resister.** H. A. Morton, Akron, O.
2,058,771. **Accelerator.** A. M. Clifford, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.
2,058,840. **Accelerator.** H. R. Thies, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.
2,059,430. **Rubber Composition.** T. and S. Arnold, Bradford, England.
2,059,448. **Rubber Composition.** A. K. Epstein and B. R. Harris, both of Chicago, Ill.
2,059,778. **Rubber Composition.** K. Dietz, Frankfurt a. M., and K. Frank, Bad Soden a. Taunus, assignors to I. G. Farbenindustrie A. G., Frankfurt a. M., all in Germany.
2,060,129. **Latex Coating Composition.** M. O. Schur, assignor to Brown Co., both of Berlin, N. H.
2,060,412. **Oil Varnish.** W. Breuers and H. Schatz, both of Ludwigshafen a. Rhine, assignors to I. G. Farbenindustrie A. G., Frankfurt a. M., all in Germany.
2,060,428. **Accelerator.** W. Scott, Nitro, W. Va., assignor, by mesne assignments, to Monsanto Chemical Co., St. Louis, Mo.

Dominion of Canada

361,217. **Plastic Substance.** J. C. Patrick, Trenton, N. J., U. S. A.
361,415. **Accelerator.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of W. E. Messer, Cheshire, Conn., U. S. A.
361,541. **Accelerator.** Goodyear Tire & Rubber Co., Akron, assignee of H. I. Cramer, Cuyahoga Falls, both in O., U. S. A.
361,570 and 361,572. **Accelerator.** Wingfoot Corp., Wilmington, Del., assignee of H. I. Cramer, Cuyahoga Falls, O., both in the U. S. A.
361,601. **Accelerator.** Wingfoot Corp., Wilmington, Del., assignee of J. G. Lichty, Stow, O., both in the U. S. A.
361,606. **Carbon Black Production.** L. M. Pidgeon and G. S. Whitby, co-inventors, both of Ottawa, Ont.
361,713. **Rubber Cement.** Canadian Industries, Ltd., Montreal, P. Q., assignee of I. Williams and C. C. Smith, co-inventors, both of Pennsgrove, N. J., U. S. A.

United Kingdom

448,849. **Seed Coating Composition.** G. E. Heyl, London.
449,026. **Paper Coating Composition.** Imperial Chemical Industries, Ltd., London.
449,056. **Latex Stabilization.** L. Mellersh-Jackson, London. (Heveatex Corp., Melrose, Mass., U. S. A.)
449,165. **Rubber Composition.** Heveatex Corp., Melrose, Mass., U. S. A.
449,255. **Powdered Rubber.** Heveatex Corp., Melrose, Mass, U. S. A.
449,428. **Latex Stabilizer.** Henkel & Cie. Ges., Dusseldorf, Germany.
449,528. **Attaching Rubber to Metal.** R. J. Reaney, Ottawa, Ont., Canada.
449,542. **Chlorinated Rubber Composition.** J. P. Baxter, Widnes, T. N. Montgomery and J. G. Moore, both of Runcorn, and Imperial Chemical Industries, Ltd., London.
449,607. **Wetting Agent.** W. J. Tennant, London. (Henkel & Cie. Ges., Dusseldorf, Germany.)
449,641. **Accelerator.** Wingfoot Corp., Wilmington, Del., U. S. A.
449,752. **Plastic Metallic Composition.** C. A. Laise, Tenafly, N. J., U. S. A.
449,779. **Lubricant.** R. W. Asprey, Concord, Australia.
449,957. **Rubber Hydrogenation.** E. I. du Pont de Nemours & Co., Wilmington, Del., U. S. A.

GENERAL

United States

2,057,687. **Pneumatic Airplane Seat.** F. G. Manson, Dayton, O.
2,057,701. **Reel Separator.** F. Zonino, Naugatuck, and A. G. Emery, New Haven, both in Conn., assignors, by mesne assignments, to United States Rubber Co., New York, N. Y.
2,057,709. **Sliding Seat Guide.** A. S. Cheston, Birmingham, England.
2,057,713. **Raincoat.** R. Edelson, Mishawaka, Ind., assignor to United States Rubber Products, Inc., New York, N. Y.
2,057,716. **Traveler Mechanism.** B. H. Foster, Maplewood, N. J., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.
2,057,718. **Electrical Device.** C. H. Gunthorp, Des Plaines, assignor to Economy Fuse & Mfg. Co., Chicago, both in Ill.
2,057,729. **Storage Battery Intercell Connecter.** A. Mayer, Detroit, Mich.
2,057,738. **Paving Block.** W. L. Pipes, Elizabeth, N. J., assignor, by mesne assignments to United States Rubber Co., New York, N. Y.
2,057,797 and 2,057,798. **Tire Repair Patch.** J. T. Springer, Los Angeles, Calif., assignor, by decree of court, to S. Springer, widow of said J. T. Springer, deceased.
2,057,799. **Tire Boot Anticreep Anchorage.** G. A. Stanzel, Des Moines, Iowa.
2,057,831. **Pile Fabric.** G. S. Hiers, Cynwyd, assignor to Collins & Aikman Corp., Philadelphia, both in Pa.
2,057,873. **Floor Covering.** E. P. Atwood, assignor to Durkee-Atwood Co., both of Minneapolis, Minn.
2,057,955. **Cushioned Railway Rail.** M. Kahn, Cologne-Riehl, Germany.
2,058,052. **Dress Shield.** S. Bendersky, Irvington, N. J.
2,058,158. **Pouch.** W. P. Koeller, assignor to Pres-To-Fill Products Co., both of Chicago, Ill.
2,058,221. **Hand Covering.** H. B. Ferguson, Seattle, Wash.
2,058,257. **Rubber Lining Retainer.** J. A. Porteous, Montreal, P. Q., Canada, assignor to United States Rubber Products, Inc., New York, N. Y.
2,058,317. **Horse Collar.** J. James, Lynnville, Ind.
2,058,340. **Hairdressers' Hairpin Holder.** C. M. Miller, Winter Park, Fla.
2,058,416. **Towel Rack Attachment.** C. S. Comstock, Great Barrington, Mass.
2,058,509. **Infant's Undergarment.** D. Rose, Waltham, Mass.
2,058,515. **Eyecup.** L. W. Schaaff, White Plains, assignor, by direct and mesne assignments, of 52% to W. M. Kuhn, New York, both in N. Y.
2,058,516. **Dropper.** L. W. Schaaff, White Plains, assignor, by direct and mesne assignments, of 52% to W. M. Kuhn, New York, both in N. Y.
2,058,557. **Tire Pressure Gage.** P. M. Bourdon, Paris, assignor to Michelin & Cie., Clermont-Ferrand, France.
2,058,583. **Cushioned Tool Handle.** F. P. Forss, Aurora, assignor to Independent Pneumatic Tool Co., Chicago, both in Ill.
2,058,623. **Rubber Cushion.** H. W. Protzeller and F. Fahland, both of Fairmont, Minn.
2,058,630. **Railway Car.** C. De L. Rice, Hartford, Conn.
2,058,674. **Packing.** W. W. Flinchum, Oklahoma City, Okla.
2,058,691. **Trailer.** W. Holsten and H. Tonn, both of Lake Mills, Wis.
2,058,693. **Phonograph.** W. H. Hutter, assignor to Rock-Ola Mfg. Corp., both of Chicago, Ill.
2,058,740. **Steering Wheel Cover.** J. R. Summers, assignor of ⅓ to R. K. Covington and ⅓ to T. E. Covington, all of Little Rock, Ark.

2,058,778. **Tire.** R. P. Dinsmore, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.
2,058,989. **Gas Mask.** A. Isaac, Lyon, assignor to Dognin-Societe Anonyme, Villeurbanne, both in France.
2,058,991. **Corset.** M. Kahn, New York, N. Y.
2,059,008. **Electrical Connecter.** F. Marquart, Cleveland, O.
2,059,030. **Resilient Vehicle Wheel.** W. Ravestein, Monster; M. A. P. Ravestein, executrix of said W. Ravestein, deceased, assignor to N. V. Handelsvereenizing V. H. Fa. Bessel-Kok, both of Amsterdam, all in Netherlands.
2,059,045. **Tire Pressure Controller.** E. A. Seymour, Grand Rapids, Mich.
2,059,055. **Submarine Cable.** E. Studt, assignor to Norddeutsche Seekabelwerke A. G., both of Nordenham, Germany.
2,059,103. **Garment Belt.** H. Hardie and J. F. Hargreaves, assignors to Faultless Mfg. Co., all of Baltimore, Md.
2,059,132. **Needled Fabric.** T. S. McDermott, assignor to Clark-Cutler-McDermott Co., both of Franklin, Mass.
2,059,203. **Sheet Rubber.** E. G. Bird, La Porte, Ind., assignor, by mesne assignments, to E. I. du Pont de Nemours & Co., Wilmington, Del.
2,059,207. **Transmission Belt.** H. W. Catt, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,059,256. **Car Wheel.** E. Latshaw, assignor to J. G. Brill Co., both of Philadelphia, Pa.
2,059,318. **Container.** P. E. de Merce, Los Angeles, Calif.
2,059,484. **Wiper Blade.** W. Paulus, assignor to Trico Products Corp., both of Buffalo, N. Y.
2,059,577. **Fountain Pen.** B. W. Hanle, Elizabeth, N. J., assignor to Eagle Pencil Co., a corporation of Del.
2,059,588. **Acoustic Device.** J. J. Kuhn, Elizabeth, N. J., assignor to Bell Telephone Laboratories, Inc., New York, N. Y.
2,059,747. **Shoe.** E. F. Roberts, Rye, assignor to United States Rubber Products, Inc., New York, both in N. Y.
2,059,748. **Wetting Device.** W. H. Rose, Jersey City, N. J.
2,059,764. **Tire.** F. Zerillo, Brooklyn, N. Y.
2,059,785. **Air Pressure Device.** A. Gaik, Chicago, Ill.
2,059,820. **Girdle and Shorts.** R. W. Spain, assignor of ½ to Henry J. Tully & Co., both of New York, N. Y.
2,059,847. **Sole Affixer.** W. C. Card, Jr., Winthrop, Mass., assignor to Compo Shoe Machinery Corp., New York, N. Y.
2,059,848. **Seat Connecter.** P. Cavitt, Watseka, Ill.
2,059,914. **Toothbrush.** G. S. Rosenberg, assignor of ½ to H. D. Kane, both of Minneapolis, Minn.
2,059,955. **Inner Tube.** M. C. McWherter, Derry, Pa.
2,059,982. **Rail Car Tire.** E. G. Budd, assignor to Edward G. Budd Mfg. Co., both of Philadelphia, Pa.
2,060,127. **Eye Protector.** W. B. Schofield, New York, N. Y.
2,060,212. **Bottle Cap and Nipple.** A. Herstein, assignor to himself and W. Fusske, joint trustees, both of Chicago, Ill.
2,060,253. **Leather-like Material.** H. P. Shopneck, Danvers, Mass.
2,060,304. **Punctured Tire Filler.** H. Grümmer, Rheinhausen-Hochemmerich, Germany.
2,060,322. **Power Transmission Mechanism.** G. W. Johnson, Cincinnati, O., assignor, by mesne assignments, to Allis-Chalmers Mfg. Co., Milwaukee, Wis.
2,060,353. **Weatherstrip.** C. A. Tea, Detroit, assignor to Chrysler Corp., Highland Park, both in Mich.
2,060,467. **Garment Waistband.** A. J. Krein, Baltimore, Md.
2,060,565. **Flywheel.** H. D. Geyer, Dayton, O., assignor, by mesne assignments, to General Motors Corp., Detroit, Mich.
2,060,566. **Fender Antisqueak Trim Strip.** H. D. Geyer, Dayton, O., assignor, by mesne assignments, to General Motors Corp., Detroit, Mich.
2,060,621. **Mop.** W. H. Jayne, Brooklyn, N. Y.
2,060,706. **Variable Pressure Therapeutic Apparatus.** C. A. Vinal, S. Weymouth, assignor to J. H. Emerson, Cambridge, both in Mass.
2,060,709. **Electrical Connection Plug.** J. Wertzheiser, Newark, assignor to Hatfield Wire & Cable Co., Hillside, both in N. J.
2,060,714. **Inner Tube.** G. Andrews, Nashville, Tenn.

Dominion of Canada

361,242. **Elastic Garment.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of P. Adamson, Rye, N. Y., U. S. A.
361,243. **Woven Fabric.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of P. Adamson, Rye, N. Y., U. S. A.
361,288. **Notebook.** Rockwell - Barnes Co., assignee of T. J. Salsman, both of Chicago, Ill., U. S. A.
361,293. **Hose Coupling.** Weatherhead Co., assignee of A. J. Weatherhead, Jr., both of Cleveland, O., U. S. A.
361,314. **Spat.** P. J. McClure, Gloversville, N. Y., U. S. A.
361,318. **Windshield Wiper and Defroster.** J. W. Shriver, Wichita, Kan., U. S. A.
361,346. **Engine Mounting.** H. C. Lord, Erie, Pa., U. S. A.
361,353. **Nut Lock.** B. Vaurs, Paris, France.
361,367. **Rubber Lining Retainer.** Dominion Rubber Co., Ltd., assignee of J. A. Porteous, both of Montreal, P. Q.
361,393. **Spring Suspension.** Steel Wheel Corp., Chicago, Ill., assignee of V. W. Kliesrath, S. Bend, Ind., both in the U. S. A.
361,424. **Tire.** General Tire & Rubber Co., assignee of H. T. Kraft, both of Akron, O., U. S. A.
361,428. **Friction Material.** Johns-Manville Corp., New York, N. Y., assignee of S. Collier, Waukegan, Ill., both in the U. S. A.
361,429. **Friction Article.** Johns-Manville Corp., New York, N. Y., assignee of F. L. Hess, Somerville, N. J., both in the U. S. A.
361,478. **Thermometer Sterilizer.** A. Warshawsky, Brooklyn, N. Y., U. S. A.
361,487. **Skate.** J. H. Ball, Calgary, Alta.
361,744. **Blasting Plug.** R. J. Heitzman, inventor, and W. E. Resler, assignee of ¼ of the interest, both of Shamokin, Pa., U. S. A.

United Kingdom

447,987. **Flexible Lead Strain Taker.** Bulpitt & Sons, Ltd., and W. H. Bulpitt, both of Birmingham.
448,037. **Electric Conduit.** G. R. Shepherd, London. (Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa., U. S. A.)
448,071. **Stocking.** Scott & Williams, Inc., New York, assignee of A. E. Page, Brooklyn, both in N. Y., U. S. A.
448,085. **Shoe.** Hungarian Rubber Goods Factory, Ltd., Budapest, Hungary.
448,087. **Vehicle Body.** E. G. Budd Mfg. Co., assignee of G. Trautvetter, both of Philadelphia, Pa., U. S. A.
448,090. **Windscreen Cleaner.** Trico Products Corp., Buffalo, N. Y., U. S. A.
448,124. **Sliding Clasp Fastening.** G. H. C. Corner, Sutton Coldfield, and Lightning Fasteners, Ltd., London.
448,223. **Tire.** W. Amsler, Feuerthalen, Switzerland.
448,228. **Clothes Hanger.** O. B. Witz, Essen, Germany.
448,274. **Cycle Handlebar.** W. Sadler, Hagley.
448,297. **Toy.** F. R. B. Whitehouse and Chad Valley Co., Ltd., both of Birmingham.
448,307. **Electric Conductor.** British Celanese, Ltd., London.
448,323. **Tire.** H. Wessel, Remscheid, Germany.
448,329. **Floor Block.** A. Elmendorf, Chicago, Ill., U. S. A.
448,367. **Bed Rest.** J. A. Jackson, Birmingham.
448,438. **Printing Surface.** G. Fischer, Bielefeld, Germany.
448,511. **Coupling.** M. Surjaninoff, Stammersdorf, Austria.
448,557. **Draught Excluder.** M. Jones, Macclesfield.
448,591. **Doll.** C. E. Bowers, Washington, D. C., U. S. A.
448,596. **Doll.** E. G. Schaeffer, Brooklyn, N. Y., U. S. A.
448,615. **Brush.** Hoover, Ltd., Greenford. (Hoover Co., N. Canton, O., U. S. A.)
448,625. **Refrigerator.** S. D. Ware, London.
448,639. **Woven Fabric.** British Celenese, Ltd., London.
448,709. **Engine Mounting.** Soc. D'Exploitation Des Brevets L. Simon (Amortisseurs Sanchok) Soc. Anon., Paris, France.
448,779. **Cable.** Marconi's Wireless Telegraph Co., Ltd., London, G. M. Wright, Woodham Ferrers, and N. M. Rust, Chelmsford.
448,780. **Advertisement Supporter.** W. C. King, Georgeham.
448,785. **Cop Dyeing Preparer.** J. Brandwood, Southport.
448,933. **Hose Pipe.** J. H., D. A., and H. D. Greenwood, all of London.
449,016. **Tire.** N. Straussler and Straussler Mechanization, Ltd., both of London.
449,021. **Wall Plug.** W. W. Hamill, Chigwell.
449,030. **Vacuum Pump.** H. R. and C. F. Batten, both of Glamorgan, Wales.
449,083. **Heat Nonconducting Covering.** C. G. Munters, Stockholm, Sweden.
449,093. **Sliding Clasp Fastening.** G. H. C. Corner, Sutton Coldfield, and Lightning Fasteners, Ltd., London.

449,136. **Tire.** Consolidated Rubber Manufacturers, Ltd., London.
449,146. **Running Shoe.** G. M. Butler, Chipperfield.
449,167. **Hair Waver.** Osborne, Garrett & Co., Ltd., Winstanley, Ltd., and G. E. Winstanley, all of London.
449,231. **Draught Excluder.** British Thomson-Houston Co., Ltd., London.
449,259. **Surgical Syringe.** H. H. Schulz and A.G. Products, Ltd., both of London.
449,287. **Tire Valve.** O. Bothe, Dusseldorf, Germany.
449,288. **Joint Packing.** Electrolux, Ltd., Luton, assignee of Aktiebolaget Elektrolux, Stockholm, Sweden.
449,303. **Friction Clutch.** Singer Mfg. Co., Elizabeth, N. J., U. S. A.
449,304. **Refrigerator.** British Thomson-Houston Co., Ltd., London.
449,319. **Spring Fork.** C. Macbeth, Birmingham.
449,336. **Shoulder Pad.** S. Frais, London.
449,358. **Bottle Capsule Applier.** E. Pommer, (trading as Korkfabrik E. Pomeranz), Vienna, Austria.
449,363. **Mat.** Schumacher & Schneider Patents, Inc., Chicago, Ill., U. S. A.
449,377. **Wearing Apparel.** E. K. Render, Hillingdon.
449,396. **Vehicle Bumper.** S. Smith, Chobham.
449,455. **Vehicle Spring Suspension.** Daimler-Benz A. G., Stuttgart, Germany.
449,506. **Folding Link Mat.** India Tyre & Rubber Co., Ltd., and C. J. Pomeroy, both of Inchinnan.
449,511. **Vehicle Body.** W. E. Knight, London.
449,518. **Valve.** P. G. Hornell, Lidingo, and N. S. Hansson, Stockholm, both in Sweden.
449,558. **Overshoe Fastener.** P. R. Youl, Glasgow, Scotland.
449,635. **Windscreen Cleaner.** M. V. Ward, London.
449,659. **Elastic Stocking.** L., W., and O. Flemmich, (trading as A. Flemmich Sohne), all of Vienna, Austria.
449,663. **Grinding Wheel.** Norton Grinding Wheel Co., Ltd., Welwyn Garden City.
449,676. **Container Seal.** Mauser Maschinenbau Ges., Ehrenfeld, Germany.
449,701. **Resilient Motor Support.** British Thomson-Houston Co., Ltd., London.
449,720. **Surgical Dressing.** F. J. Farrell, Beccles.
449,738. **Wheel.** Svenska Aktiebolaget Bromsregulator, Malmo, Sweden.
449,744. **Battery.** Chloride Electrical Storage Co., Ltd., and A. W. Browne, both of Clifton Junction.
449,778. **Animal Drinking Device.** A. Wilson, Glasgow, Scotland.
449,787. **Wearing Apparel.** G. A. Barcley, Newark, N. J., U. S. A.
449,798. **Vehicle Spring Suspension.** General Motors Corp., Detroit, Mich., U. S. A.
449,823. **Pad Holder.** A. Read, Derby.
449,824. **Electrostatic Meter.** Egyesult Izzolampa Es Villa-Mossagi Reszvenytarsasag, Ujpest, Hungary.
449,841. **Paint Brush.** Beechwood, Ltd., and E. A. Wilcock, both of Chesham.
449,856. **Hose.** Textil - Syndikatges., Chemnitz, Germany.
449,889. **Tire Inflator.** T. Lennard, Toronto, Ont., Canada.
449,905. **Helmet.** E. H. Thierry, Hounslow.
449,931. **Tire Pressure Gage.** W. Turner, Sheffield.
449,969. **Galosh.** M. M. Grant, Interlaken, Switzerland.
449,973. **Ferrule.** India Tyre & Rubber Co., Ltd., and C. J. Pomeroy, both of Inchinnan.
449,979. **Coated Fabric.** F. B. Dehn, London. (Seaman Paper Co., Chicago, Ill., U. S. A.)
449,985. **Retractive Switch.** S. Satch, Tokio, and F. Shibutani, Aomoriken, both in Japan.
449,990. **Driving Belt.** Wingfoot Corp., Wilmington, Del., U. S. A.

TRADE MARKS

United States

338,932. **Apro-Tecto.** Sanitary aprons. Sport Lane, Inc., Cleveland, O.
338,934. **Snodotte.** Acid product for rubber, etc. Wyandotte Oil & Fat Co., Cleveland, O.
338,947. **Velvene.** Preparation for use as an accelerator and dispersing agent. W. C. Hardesty Co., Inc., New York, N. Y.
338,974. **Golf King.** Golf balls. Ford Hopkins Co., doing business as Golf King Co., Chicago, Ill.
339,159. **Plioweld.** Rubber tank linings. Goodyear Tire & Rubber Co., Akron, O.
339,177. **Creslac.** Electrical current carrying cordage. Crescent Insulated Wire & Cable Co., Trenton, N. J.
339,196. Representation of a winged foot between the word: **"Goodyear."** Hose and belting. Goodyear Tire & Rubber Co., Akron, O.
339,209. Shield containing representations of a tennis player, golfer, runner, and baseball player; initials: **"NSGA;"** and the words: **"It pays to play."** Balls. National Sporting Goods Assn., Cleveland, O.
339,215. **Marbon.** Rubber hydrochloride, cast films thereof, and coatings for paper sheets. Marbo Products Corp., Chicago, Ill.
339,217. **Marbo.** Rubber chloride, rubber hydrochloride, chlorinated rubber hydrochloride, casein, gelatin, cast films thereof, and coatings for paper sheets. Marbo Products Corp., Chicago, Ill.
339,261. **High and Dry.** Raincoats. Plottel Bros., New York, N. Y.
339,323. **Dauntless.** Golf balls. United States Rubber Products, Inc., New York, N. Y.
339,324. **Triumph.** Golf balls. United States Rubber Products, Inc., New York, N. Y.
339,448. Representation of electric flashes and the word: **"Spur"** emanating therefrom. Storage batteries. Fisk Rubber Corp., Chicopee Falls, Mass.
339,454. **Filex.** Elastic yarn. Caoutchouc Laboratories, Inc., New York, N. Y.
339,455. **Filex.** Elastic fabrics. Caoutchouc Laboratories, Inc., New York, N. Y.
339,484. **Everseal.** Rubber for securing glass in frame channels. C. H. Walker, doing business as Everseal Products Co., Detroit, Mich.
339,492. **Progress.** Rubber type, type sets, office printing outfits, type dates and holders, sign markers, etc. Superior Type Co., Chicago, Ill.
339,502. Representation of a striped package containing a rolled up bathing cap and a pair of latex pants. Bathing caps, latex baby pants, and latex swim pants. International Latex Corp., Rochester, N. Y.
339,508. Representation of a gauntlet and above it the word: **"Durawear."** Chemical and latex or rubber treated glove material. Landers Corp., Toledo, O.
339,589. **Pennant.** Tires. Federal Rubber Co., Chicopee Falls, Mass.
339,596. **Red Wolf.** Belting. F. L. Langdon, doing business as Langdon Feeder Co., Kansas City, Mo.
339,635. **Multi-Stop.** Tires. Fisk Rubber Corp., Chicopee Falls, Mass.
339,753. **Timol.** Tire molds. American Steel Foundries, Chicago, Ill.
339,758. **Sur-Rug Insures Rugs from Slipping.** Liquid rubber in ammonia solution applied on backs of rugs to prevent slippage. Sambo Dairy Products, Inc., Brooklyn, N. Y.
339,774. **A-77.** Accelerator. Rubber Service Laboratories Co., Akron, O., assignor to Monsanto Chemical Co., Wilmington, Del.
339,782. Diamond containing the letters: **"D-X."** Tires and inner tubes. Mid-Continent Petroleum Corp., Tulsa, Okla.
339,783. Diamond containing the letters: **"MPC."** Tires and inner tubes. Mid-Continent Petroleum Corp., Tulsa, Okla.
339,793. **Moss Rub.** Pile fabric rugs. Sidney Blumenthal & Co., Inc., New York, N. Y.
339,794. **Super Lastique.** Corset and brassiere elastic piece goods. Artistic Foundations, Inc., New York, N. Y.
339,795. **Twin Lastique.** Corset and brassiere elastic piece goods. Artistic Foundations, Inc., New York, N. Y.
339,872. **Atlas Lug Grip.** Tires. Atlas Supply Co., Newark, N. J.
339,900. **Conture.** Sanitary belts. I. B. Kleinert Rubber Co., New York, N. Y.
339,926. **Supreme.** Electrical wires and cables. General Cable Corp., New York, N. Y.
339,981. **Anode.** Rubber covered wire mesh dish drainers, beverage bottle cases, milk bottle carriers, and test tube racks. B. F. Goodrich Co., New York, N. Y.
340,046. **"Étude."** Brassieres, corsets, panties, girdles, garter belts, etc. Maiden Form Brassiere Co., Inc., New York, N. Y.
340,050. **Latexeen.** Bathing and shower caps. American Latex Corp., New York, N. Y.
340,101. **Zephyr.** Cold patching cement. Goodyear Tire & Rubber Co., Akron, O.
340,108. **Dillectric.** Portable electric repair vulcanizers. Dill Mfg. Co., Cleveland, O.
340,114. Representation of a seal containing the word: **"Sealleak."** Pneumatic tire fluids. F. A. Seiberling, doing business as Fred A. Seiberling Mfg. Co., Chicago, Ill.
340,135. **Moldette.** Chin strap and facial contour molder. M. Quiros, New York, N. Y.
340,225. Label containing representation of a bather stretching the cap on her head the length of her arm. Bathing and shower caps. American Latex Corp., New York, N. Y.

Market Reviews

CRUDE RUBBER

Commodity Exchange

TABULATED WEEK-END CLOSING PRICES

Futures	Oct. 31	Nov. 28	Dec. 5	Dec. 12	Dec. 19	Dec. 26
Nov.	17.09	.....	.....	.....	.....	.....
Dec.	17.12	18.54	19.20	18.87	20.33	21.57
Jan.	.....	18.55	19.25	18.89	20.36	21.62
Mar.	17.15	18.55	19.28	18.97	20.41	21.67
July	17.19	18.55	19.23	18.83	20.25	21.30
Sept. ...	17.27	18.55	19.21	18.82	20.20	21.22
Oct.	.....	18.55	19.21	18.81	20.21	21.21
Volume per week (tons)...	9,640	6,250	8,940	7,840	17,780	11.900

THE accompanying table shows prices of representative future contracts on the New York market during approximately the last two months.

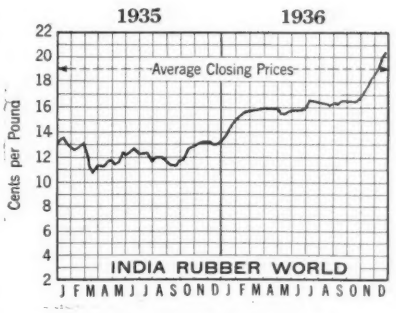
A strong upward tendency in price featured the market during December. This condition has persisted since early in November, when the price reached 17⅛¢ and passed the 18¢ level on November 16. From December 1, at 18½¢, ribbed smoked sheet climbed steadily to 20¢ on December 15 and hovered around 20¢ for some time. The rising trend of prices became very active on December 23 under speculative influence, and for several days the strong upward swing followed that in London, resulting in run-away market conditions that carried the price of spot to 23¼¢ on December 28, followed the next day by market weakness and a drop to 22⅝¢. The opening price on December 30 was 22$^{11}/_{20}$¢, declining in a few hours to 21⅝¢.

On December 15 the International Rubber Regulation Committee increased the quota to 75%, effective January 1, 1937, over the October increase to 70%. The committee also set the quota at 80%, effective April 1, 1937. The announcement of these quota increases had a steadying effect on the market.

Rubber stocks in the United States are maintained in sparing proportions. Even in this respect the United States has the advantage of a lower freight rate compared to that for shipments to London and Liverpool. The low credit status of Russia, Germany, and Italy acts to preclude those countries from importing rubber freely from the Far East; hence they depend on British stocks mainly, which tends to overdraw on that source of supply.

New York Outside Market

The steadily rising price for ribbed smoked sheets which featured the market entirely throughout November served markedly to restrict factory buying interest. However some heavy buying developed early in the month just previous to the price reaching the 19¢ level. Beyond that price factories became very reluctant to buy. Another important influence restricting factory interest was the approach of the year-end inventory period when restocking supplies of all kinds is necessarily curtailed.



New York Outside Market—Spot Ribbed Smoked Sheets

Runaway market activity, developed a few days before Christmas, carried the price of ribbed smoked sheet rapidly upward until it reached 23¼¢ on December 28. This price was purely speculative and nominal since there was no factory buying. On December 30 spot was offered at 21⅝¢.

Week-end closing prices on No. 1

New York Outside Market—Spot Closing Prices—Plantation Grades—Cents per Pound

	November, 1936							December, 1936															
	23	24	25	26*	27	28	30	1	2	3	4	5	7	8	9	10	11	12	14	15	16	17	18	19
No. 1 Ribbed Smoked Sheet	18⅛	18¼	18⅜	..	18⅜	18⅜	18½	18½	18⅝	18⅝	19	19⅜	19⅝	19⅜	19⅛	19⅛	19	19	19¼	19⅛	20¼	20¼	20⅜	20⅛
No. 2 Ribbed Smoked Sheet	18⅛	18⅛	18⅛	..	18½	18½	18⅛	18⅛	18⅛	18⅛	18⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19	19	19⅜	19⅞	20⅛	20⅛	20⅛	20⅜
No. 3 Ribbed Smoked Sheet	18	18⅛	18¼	..	18⅛	18⅛	18⅜	18⅜	18½	18½	18⅞	19¼	19⅛	19¼	19	19⅛	18⅛	18⅛	19⅛	19⅞	20⅛	20⅛	20⅛	20⅜
No. 4 Ribbed Smoked Sheet	18	18⅛	18¼	..	18⅛	18⅛	18⅜	18⅜	18½	18½	18⅞	19¼	19⅛	19¼	19	19⅛	18⅛	18⅛	19⅛	19⅛	20⅛	20⅛	20¼	20⅛
No. 1 Thin Latex Crepe...	18⅜	19	19⅛	..	19⅛	19⅛	19¼	19¼	19⅜	19⅜	20	20⅜	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	21⅛	21⅜	21⅜	21½	21⅛
No. 1 Thick Latex Crepe..	18⅞	19	19⅛	..	19⅛	19⅛	19¼	19¼	19⅜	19⅜	20	20⅜	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	21⅛	21⅜	21⅜	21½	21⅛
No. 1 Brown Crepe.....	18⅛	18⅛	18⅛	..	18½	18½	18⅞	18⅞	18⅞	18⅞	18⅛	19⅛	19⅛	19⅛	19⅛	19⅜	19	19	19¼	19⅛	20¼	20¼	20⅜	20⅛
No. 2 Brown Crepe.....	18	18⅛	18¼	..	18⅛	18⅛	18⅜	18⅜	18½	18½	18⅞	19¼	19	19¼	19	19⅛	18⅛	18⅛	19⅛	19⅞	20⅛	20⅛	20⅛	20⅜
No. 2 Amber.....	18⅛	18⅛	18⅛	..	18½	18½	18⅞	18⅞	18⅞	18⅞	18⅛	19⅛	19⅛	19⅛	19⅛	19⅜	19	19	19¼	19⅛	20¼	20¼	20⅜	20⅛
No. 3 Amber.....	18	18⅛	18¼	..	18⅛	18⅛	18⅜	18⅜	18½	18½	18⅞	19¼	19	19¼	19	19⅛	18⅛	18⅛	19⅛	19⅞	20⅛	20⅛	20⅛	20⅜
No. 4 Amber.....	17½	17⅝	17¾	..	17⅛	17⅛	17⅞	17⅞	18⅜	18⅜	18¾	19⅛	18⅞	19⅛	18⅞	18⅛	18⅛	18⅛	19⅛	19¾	20⅛	20⅛	20⅛	20¼
Rolled Brown	17⅝	18	18⅛	..	18⅛	18⅛	18¼	18¼	18⅛	18⅛	18½	18⅞	18⅝	18⅞	18⅝	18⅛	18⅛	18⅛	18⅛	19½	19⅛	19⅛	19⅛	20

*Holiday.

New York Outside Market (Continued)

	December, 1936					
	21	22	23	24	25*	26*
No. 1 Ribbed Smoked Sheet.....	20¼	20⅜	20⅛	21⅝	..	..
No. 2 Ribbed Smoked Sheet.....	20⅛	20⅛	20⅞	21⅛	..	..
No. 3 Ribbed Smoked Sheet.....	20⅛	20⅛	20⅞	21⅛	..	..
No. 4 Ribbed Smoked Sheet.....	20¼	20¼	20⅛	21½	..	..
No. 1 Thin Latex Crepe.....	21⅜	21½	22⅛	22⅞	..	..
No. 1 Thick Latex Crepe.....	21⅜	21½	22⅛	22⅞	..	..
No. 1 Brown Crepe.....	20¼	20⅜	20⅛	21⅛	..	..
No. 2 Brown Crepe.....	20⅛	20⅛	20⅞	21½	..	..
No. 2 Amber.....	20¼	20⅜	20⅛	21⅛	..	..
No. 3 Amber	20⅛	20⅛	20⅞	21½	..	..
No. 4 Amber.....	20⅛	20⅛	20¾	21⅜	..	..
Rolled Brown	19⅛	19⅛	20½	21¼	..	..

*Holiday.

Foreign Trade Information

For further information concerning the inquiries listed below address United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Room 734, Custom House, New York, N. Y.

No.	COMMODITY	CITY AND COUNTRY
‡2,039	Synthetic, oilproof rubber	Prague, Czechoslovakia.
*2,059	Heels	Istanbul, Turkey
†2,068	Hose	Bandoeng, Java
†2,076	Balloons, toys, rubber hosiery, hospital sheetings, and hard rubber specialties.	Welland, Canada
†2,078	Tires and tubes.....	Lima, Peru
†2,079	Transmission and conveyer belting....	Lima, Peru
†2,095	Tire vulcanizers	Lima, Peru
†2,127	Rubber goods	Bridgetown, Barbados

*Purchase. †Agency. ‡Purchase and agency.

ribbed smoked sheets follow: December 5, 19⅜¢; December 12, 19¢; December 19, 20⅞¢; December 26, 21⅝¢; January 2, 21¹/₁₀¢.

New York Quotations

New York outside market rubber quotations in cents per pound

	Dec. 26, 1935	Nov. 25, 1936	Dec. 26, 1936
Paras			
Upriver fine	13	22¾	24¾
Upriver fine	*15¾	*26½	*29½
Upriver coarse	9	12½	15
Upriver coarse	*12⅝	*18¼	*22
Islands fine	13	21¾	24¼
Islands fine	*15¾	*26	*29
Acre, Bolivian fine	13¼	22¾	25
Acre, Bolivian fine	*15⅞	*26½	*30
Beni, Bolivian	13½	23	25¼
Madeira fine	13	22½	24¾
Caucho			
Upper ball	9	12½	15
Upper ball	*12⅝	*18¼	*22
Lower ball	8½	12¼	14½
Pontianak			
Bandjermasin	6¼	7	6
Pressed block	12/15	10/20	12/21
Sarawak	6¼	7	6
Guayule			
Duro, washed and dried	12	13¾	16
Ampar	13	14	16½
Africans			
Rio Nuñez	13½	16¾	19
Black Kassai	13½	16¾	19½
Prime Niger flake	25	27	28½
Gutta Percha			
Gutta Siak	12⅜	10½	10½
Gutta Soh	13	12½	13½
Red Macassar	2.20	1.10	1.00
Balata			
Block, Ciudad Bolivar	30	32	30
Manaos block	27	25	27
Surinam sheets	35	32	36
Amber	38	36	39

*Washed and dried crepe. Shipments from Brazil.

IMPORTS, CONSUMPTION, AND STOCKS

United States and World Statistics of Rubber Imports, Exports, Consumption, and Stocks

Twelve Months	U. S. Imports* Tons	U. S. Consumption Tons	U. S. Stocks Mfgrs., Importers, Dealers, Etc.† Tons	U. S. Stocks Afloat† Tons	U. K.—Public Warehouses, London, Liverpool†‡ Tons	Singapore and Penang Dealers and Port Stocks†‡ Tons	World Production (Net Exports)‡ Tons	World Consumption Estimated‡ Tons	World Stocks†‡§ Tons
1934	469,484	453,223	355,000	47,644	134,927	62,142	1,019,200	944,141	729,391
1935	448,116	491,544	303,000	39,094	164,295	28,304	872,722	942,924	634,196
1936									
January	31,292	48,506	285,054	43,870	162,107	31,195	62,726	83,993	569,826
February	35,219	36,746	282,902	46,532	157,028	38,421	64,019	68,635	572,323
March	37,451	42,703	276,823	58,935	147,712	29,322	69,252	80,132	590,475
April	40,365	51,897	264,228	47,678	140,404	32,200	60,030	85,336	527,178
May	35,600	50,482	248,317	48,860	130,590	26,687	68 837	90,090	501,582
June	41,802	52,636	245,886	47,228	122,285	28,260	66,478	87,829	532,992
July	35,847	48,127	234,498	60,343	113,386	29,493	83,850	86,697	490,074
August	42,563	46,657	229,056	63,597	108,215	28,289	71,116	81,379	468,238
September	48,386	46,330	228,477	62,240	103,962	26,936	72,326	82,177	490,961
October	40,920	49,509	219,553	67,825	96,625	24,593	80,422	89,733	448,560
November	44,296	50,303	212,515	73,691	.....	.....	.....	.....	.....

*Including liquid latex. †Stocks on hand the last of the month or year. ‡Statistical Bulletin of the International Rubber Regulation Committee. §Stocks at U. S. A., U. K., Singapore and Penang, Para, Manaos, and afloat.

CRUDE rubber consumption by United States manufacturers for November, 1936, is estimated at 50,303 long tons, against 49,509 long tons for October, an increase of 1.6% over October and 18.9% above the November, 1935, revised figure of 42,310 long tons, according to the R.M.A.

Crude rubber imports for November totaled 44,296 long tons, 8.3% over the October figure of 40,920 long tons and 53.7% over the 28,826 long tons imported in November, 1935.

The estimated total domestic stocks of crude rubber on hand November 30 were 212,515 long tons, against October 31 stocks of 219,553 long tons and 308,993 (revised) long tons on hand November 30, 1935.

Crude rubber afloat to United States ports on November 30 is estimated at 73,691 long tons compared with 67,825 long tons afloat on October 31 and 46,588 long tons afloat on November 30, 1935.

London and Liverpool Stocks

Week Ended	Tons London	Tons Liverpool
Nov. 28	37,614	51,614
Dec. 5	36,156	49,129
Dec. 12	34,873	47,613
Dec. 19	33,981	46,334
Dec. 26	33,237	45,884

RECLAIMED RUBBER

PRODUCTION and consumption tonnages for November were 2.6% and 4.6%, respectively, less than corresponding figures for October, but are still 41% and 63%, respectively, in excess of February, 1936, which was the low point of the year. The ratio of reclaim consumption to crude rubber fell off from 25.5% in October to 23.9% in November, as compared with 20% in February. The outlook for the next three months appears very encouraging as production is increasing on all types, apparently fast enough to increase United States stocks approximately 1,746 tons, by the end of November even though there is an increasing demand for reclaim as the price of crude rubber advances.

From November 25 to December 26, the following advances in quotations on standard reclaims were made: compounded tube and red tube, each by ½¢ per pound; and miscellaneous white, by ¾¢ per pound to ½¢ per pound. Quotations on other standard reclaims remain unchanged.

United States Reclaimed Rubber Statistics—Long Tons

Year	Production	Consumption	Consumption % to Crude	U. S. Stocks*	Exports
1934	110,010	100,597	22.3	23,079	4,737
1935	122,140	113,530	22.9	25,069	5,383
1936					
January	11,665	10,039	20.7	26,145	572
February	10,188	7,366	20.0	28,267	455
March	10,712	8,767	20.5	29,161	591
April	11,382	10,333	19.9	22,274	589
May	11,512	10,396	20.6	22,852	635
June	11,935	11,548	21.9	22,738	596
July	12,330	11,816	24.6	22,602	633
August	12,856	10,993	23.6	23,750	617
September	12,959	11,170	24.1	24,950	582
October	14,737	12,606	25.5	26,389	592
November	14,357	12,029	23.9	28,135	...

*Stocks on hand the last of the month or year.
Compiled by The Rubber Manufacturers Association, Inc.

New York Quotations

December 26, 1936

	Sp. Grav.	¢ per lb.
Auto Tire		
Black Select	1.16-1.18	5¾/ 5⅝
Acid	1.18-1.22	6¼/ 6½
Shoe		
Standard	1.56-1.60	6½/ 6¾
Tube		
No. 1 Floating	1.00	16 /16¼
Compounded	1.10-1.12	8¼/ 8½
Red Tube	1.15-1.30	8¼/ 8¾
Miscellaneous		
Mechanical Blends	1.25-1.50	3⅞/ 4½
White	1.35-1.50	12 /12½

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

COMPOUNDING INGREDIENTS

CARBON BLACK. The demand for carbon black during the last quarter of 1936 was very strong, and evidence exists that it will so continue through the first quarter of 1937. The effect of increased demand on price tends to be offset at the moment by new production plans announced in several quarters. It is anticipated that the business with the rubber companies will continue at a high rate for most of the coming year.

FACTICE. The demand for factice and rubber substitutes has increased with the consumption of crude rubber and reclaim. The duty of 4½¢ a pound placed on imported oils has greatly affected the price situation; consequently the outlook indicates higher prices in 1937.

LITHARGE. The demand is seasonal and steady. An advance in price of ¼¢ a pound was announced about the middle of December.

LITHOPONE. The demand is mild, but steady at the reduced prices established a few months ago.

RUBBER CHEMICALS. Prices on accelerators and antioxidants for 1937 are firm. Many of these products will remain unchanged, but a limited number will be advanced slightly because of increased cost of raw materials and labor.

RUBBER COLORS. The demand for chromium oxide pigments continues fairly steady. The raw material market has advanced slightly, and labor costs have increased. These two factors have necessitated an advance on the standard grades of chromium oxide.

RUBBER SOLVENT. Prices hold firm and unchanged, and demand holds strong and steady for requirements particularly of tire manufacturers.

STEARIC ACID. Prices are strong, and the demand is reported to be good.

TITANIUM PIGMENTS. During the past quarter rubber manufacturers continued to show remarkably strong interest in titanium pigments. This indicates a brisk movement in white and light colored rubber goods, especially in footwear in preparation for the next season. Contracts from rubber manufacturing consumers are coming in promptly to cover commitments for the entire year 1937, most of which are in excess of those for 1936. Prices continue firm at the levels established November 2, with indications that no change may be expected during the first quarter of 1937.

ZINC OXIDE. The zinc oxide market is firm at current prices, guaranteed until March 31, 1937. Shipments are at a very good rate, but demand by the rubber trade during the coming quarter is problematical.

New York Quotations

December 26, 1936

Prices Not Reported Will Be Supplied on Application

Abrasives		
Pumicestone, powdered	lb.	$0.02½/$0.03½
Rottenstone, domestic	lb.	.03 / .03½
Silica, 15	ton	38.00
Accelerators, Inorganic		
Lime, hydrated	ton	20.00
Litharge (commercial)	lb.	.085
Accelerators, Organic		
A-1	lb.	.24 / .28
A-5-10	lb.	.33 / .36
A-10	lb.	
A-11	lb.	.60 / .75
A-16	lb.	.55 / .65
A-19	lb.	.56 / .75
A-32	lb.	.70 / .80
A-77	lb.	.46 / .55
Accelerator 49	lb.	
808	lb.	
833	lb.	
Acrin	lb.	
Aldehyde ammonia	lb.	
Altax	lb.	
Beutene	lb.	
Butyl Zimate	lb.	
C-P-B	lb.	
Captax	lb.	
Crylene	lb.	
Paste	lb.	
D-B-A	lb.	
Di-Esterex	lb.	
Di-Esterex-N	lb.	
DOTG	lb.	
D.O.T.T.U.	lb.	
DPG	lb.	.55 / .65
El-Sixty	lb.	
Ethylideneaniline	lb.	
Formaldehyde P.A.C.	lb.	
Formaldehydeaniline	lb.	
Formaldehyde-para-toluidine	lb.	
Guantal	lb.	.42 / .51
Hepteen	lb.	
Base	lb.	
Hexamethylenetetramine	lb.	
Lead oleate, No. 999	lb.	.12
Witco	lb.	.12
Methylenedianilide	lb.	
Monex	lb.	
Novex	lb.	
O. N. V.	lb.	
Ovac	lb.	
Pipsolene	lb.	1.60 / 1.85
R-2	lb.	1.50 / 1.80
Base	lb.	3.30 / 3.75
R & H 50-D	lb.	
Safex	lb.	
Super-sulphur No. 1	lb.	
No. 2	lb.	
Tetrone A	lb.	
Thiocarbanilide	lb.	
Thionex	lb.	
Trimene	lb.	
Base	lb.	
Triphenyl guanidine (TPG)	lb.	
Tuads	lb.	
Ureka	lb.	.62 / 1.00
Blend B	lb.	.62 / .75
C	lb.	.58 / .69
Vulcanex	lb.	
Vulcanol	lb.	
Vulcone	lb.	
Z-B-X	lb.	
Z-88-P	lb.	$0.48 /$0.60
Zenite	lb.	
A	lb.	
B	lb.	
Zimate	lb.	
ZML	lb.	
Activator		
Barak	lb.	
Age Resisters		
AgeRite Alba	lb.	
Exel	lb.	
Gel	lb.	
Hipar	lb.	
HP	lb.	
Powder	lb.	
Resin	lb.	
D	lb.	
Syrup	lb.	
White	lb.	
Akroflex C	lb.	
Albasan	lb.	
Antox	lb.	
B-L-E	lb.	
B-X-A	lb.	
Copper Inhibitor X-872	lb.	
Flectol B	lb.	.54 / .65
H	lb.	.54 / .65
White	lb.	.95 / 1.15
M-U-F	lb.	
Neozone (standard)	lb.	
A	lb.	
C	lb.	
D	lb.	
E	lb.	
Oxynone	lb.	.66 / .75
Parazone	lb.	
Perflectol	lb.	.67 / .75
Permalux	lb.	
Santoflex A	lb.	
Solux	lb.	
Thermoflex	lb.	
A	lb.	
V-G-B	lb.	
Alkalies		
Caustic soda, flake, Columbia (400 lb. drums)	100 lbs.	3.00 / 4.00
liquid, 50%	100 lbs.	2.25
solid (700 lb. drums)	100 lbs.	2.60 / 3.00
Antiscorch Materials		
Antiscorch T	lb.	
Cumar RH	lb.	.09
Retarder B	lb.	
W	lb.	
T-J-B	lb.	
U.T.B.	lb.	
Antisun Materials		
Heliozone	lb.	
Sunproof	lb.	
Brake Lining Saturant		
B. R. T. No. 3	lb.	.016 / .018
Colors		
BLACK		
Lampblack (commercial)	lb.	.15
BLUE		
Brilliant	lb.	
Prussian	lb.	
Toners	lb.	$0.80 /$3.50
BROWN		
Mapico	lb.	.13
GREEN		
Brilliant	lb.	
Chrome, light	lb.	
medium	lb.	
oxide	lb.	.20
Dark	lb.	
Guignet's	lb.	.70
Light	lb.	
Toners	lb.	.85 / 3.50
ORANGE		
Lake	lb.	
Toners	lb.	.40 / 1.60
ORCHID		
Toners	lb.	1.50 / 2.00
PINK		
Toners	lb.	1.50 / 4.00
PURPLE		
Permanent	lb.	
Toners	lb.	.60 / 2.00
RED		
Antimony		
Crimson, 15/17%	lb.	
R. M. P. No. 3	lb.	.46
Sulphur free	lb.	.48
Golden 15/17%	lb.	
7-A	lb.	.35
Z-2	lb.	.22
Aristi	lb.	
Cadmium, light (400 lb. bbls.)	lb.	.70
Chinese	lb.	
Crimson	lb.	
Mapico	lb.	.09¼
Medium	lb.	
Rub-Er-Red	lb.	.09¼
Scarlet	lb.	
Toners	lb.	.80 / 2.00
WHITE		
Lithopone (bags)	lb.	.04¼/ .04½
Albalith Black Label-11	lb.	.04¼/ .04½
Astrolith (5-ton lots)	lb.	.04¼
Azolith	lb.	.04¼/ .04½
Cryptone-19	lb.	.05¾/ .06
CB-21	lb.	.05¾/ .06
ZS No. 20	lb.	.09 / .09¼
No. 86	lb.	.09 / .09¼
Sunolith (5-ton lots)	lb.	.04¼
Ray-Bar	lb	
Ray-Cal	lb.	
Rayox	lb.	
Titanolith (5-ton lots)	lb.	.05¾
Titanox-A (50-lb. bags)	lb.	.16 / .16¾
B (50-lb. bags)	lb.	.05¾/ .06
B-30 (50-lb. bags)	lb.	.05¾/ .06
C (50-lb. bags)	lb.	.05¾/ .06
Ti-Tone	lb.	
Zinc Oxide		
Anaconda, Green Seal No. 333	lb.	.06¼/ .06½

Lead Free No. 352	lb.	$0.05¼/$0.05½
No. 570	lb.	.05¼/ .05½
No. 577	lb.	.05¼/ .05½
Red Seal No. 222	lb.	.05¾/ .06
U.S.P. No. 777 (bbls.)	lb.	.08
White Seal No. 555	lb.	.06¾/ .07
Azo ZZZ-11	lb.	.05¼/ .05½
44	lb.	.05¼/ .05½
55	lb.	.05¼/ .05½
66	lb.	.05¼/ .05½
French Process, Florence White Seal-7 (bbls.)	lb.	.06¾/ .07
Green Seal-8	lb.	.06¼/ .06½
Red Seal-9	lb.	.05¾/ .06
Kadox, Black Label-15	lb.	.05¼/ .05½
Blue Label-16	lb.	.05¼/ .05½
Red Label-17	lb.	.05¼/ .05½
Horse Head Special 3	lb.	.05¼/ .05½
XX Red-4	lb.	.05¼/ .05½
23	lb.	.05¼/ .05½
72	lb.	.05¼/ .05½
78	lb.	.05¼/ .05½
80	lb.	.05¼/ .05½
103	lb.	.05¼/ .05½
110	lb.	.05¾/ .05½
St. Joe (lead free) Black Label No. 20	lb.	.05¼/ .05½
Green Label No. 42	lb.	.05¼/ .05½
Red Label No. 30	lb.	.05¼/ .05½
U.S.P. X	lb.	.08 / .08¼
White Jack	lb.	.09 / .09¼
YELLOW		
Cadmolith (cadmium yellow), 400 lb. bbls.	lb.	.45
Lemon	lb.	
Mapico	lb.	.09½
Toners	lb.	2.50

Dispersing Agents

Bardol	lb.	.021 / .023
Darvan	lb.	

Factice

Amberex	lb.	.23
Brown	lb.	.09 / .125
Duphax A	lb.	.13
B	lb.	.13
Fac-Cel B	lb.	.15
C	lb.	.15
White	lb.	.10 / .145

Fillers, Inert

Asbestine, c.l., f.o.b. mills	ton	15.00
Barytes	ton	30.00
f.o.b. St. Louis (50 lb. paper bags)	ton	22.85
off color, domestic	ton	20.00 /25.00
white, imported	ton	29.00 /32.00
Blanc fixe, dry, precip.	lb.	.03½/ .05
Calcene	ton	37.50 /45.00
Infusorial earth	lb.	.02 / .03
Kalite No. 1	ton	
No. 3	ton	
Magnesia, calcined, heavy	lb.	.04
carbonate	lb.	.06½/ .07
Pyrax	ton	
Whiting		
Columbia Filler	ton	9.00 /14.00
Domestic	100 lbs.	
Guilders	100 lbs.	
Hakuenka	lb.	
Paris white, English cliff-stone	100 lbs.	
Southwark Brand, Commercial	100 lbs.	
All other grades	100 lbs.	
Suprex, white extra light	ton	45.40 /60.00
heavy	ton	45.40 /60.00
Witco, c.l.	ton	7.00

Fillers for Pliability

P-33	lb.	
Thermax	lb.	
Velvetex	lb.	.03 / .04½

Finishes

IVCO lacquer, clear	gal.	1.00 / 2.25
colors	gal.	2.85 / 3.25
Rubber lacquer, clear	gal.	
colored	gal.	
Starch, corn, pwd.	100 lbs.	
potato	lb.	
Talc	ton	25.00 /45.00

Flock

Cotton flock, dark	lb.	.11½/ .14
dyed	lb.	.50
white	lb.	.14½/ .20
Rayon flock, colored	lb.	1.25 / 1.60
white	lb.	1.10

Latex Compounding Ingredients

Accelerator 85	lb.	
89	lb.	
122	lb.	
552	lb.	
Alphasol-OS	lb.	
Antox, Dispersed	lb.	
Aquarex A	lb.	
D	lb.	
F	lb.	
Aresklene 375	lb.	.35 / .50
Black No. 25, Dispersed	lb.	.22 / .40
Catalpo	ton	
Color Pastes, Dispersed	lb.	
Dispersex No. 15	lb.	.80 / .95
No. 20	lb.	.60 / .75
Emo, brown	lb.	.14
white	lb.	.14
Factice Compound, Dispersed	lb.	$0.36
Heliozone, Dispersed	lb.	
Igepon A	lb.	
MICRONEX, Colloidal	lb.	.06 /$0.07
Nekal BX (dry)	lb.	
Palmol	lb.	.10
Paradors	lb.	
Stablex A	lb.	1.75
B	lb.	.90
C	lb.	.30
Sulphur, Dispersed	lb.	.10 / .15
No. 2	lb.	
T.1. (400 lb. drums)	lb.	.40
Tepidone	lb.	
Vulcan Colors	lb.	
Zinc oxide, Colloidal	lb.	
Dispersed	lb.	.09 / .15

Mineral Rubber

B. R. C. No. 20	lb.	.0125/ .014
Black Diamond	ton	25.00
Genasco Hydrocarbon, granulated, (fact'y)	ton	
solid	ton	
Gilsonite Hydrocarbon (factory)	ton	
Hydrocarbon, hard	ton	
soft	ton	
Parmr Grade 1	ton	25.00
Grade 2	ton	25.00
Pioneer	ton	
265°	ton	

Mold Lubricants

Mold Paste	lb.	.12 / .30
Sericite	ton	65.00 /75.00
Soapbark	lb.	
Soapstone	ton	25.00 /35.00

Oil Resistant

AXF	lb.	

Reclaiming Oils

B. R. V.	lb.	.039 / .041
S. R. O.	lb.	.015 / .019

Reenforcers

Carbon Black		
Aerfloted Arrow Specification Black	lb.	.0535/ .0825
Arrow Compact Granulized Carbon Black	lb.	
"Certified" Heavy Compressed, Cabot	lb.	
Spheron	lb.	
Disperso (delivered)	lb.	.0445/ .0535
Dixie, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock delivered	lb.	.07 / .08¼
Dixiedensed, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock delivered	lb.	.07 / .08¼
Dixiedensed 66, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock delivered	lb.	.07 / .08¼
Excello, c.l., f.o.b. Gulf ports	lb.	.0445/ .0645
delivered New York	lb.	.0535/ .0735
l.c.l., delivered New York	lb.	.07 / .08¼
Fumonex, c.l., f.o.b. works	lb.	.03
ex-warehouse	lb.	.04½
Gastex	lb.	.03 / .07
Kosmobile, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, delivered	lb.	.07 / .08¼
Kosmobile 66, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock delivered	lb.	.07 / .08¼
Kosmos, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock delivered	lb.	.07 / .08¼
MICRONEX Beads, c.l., f.o.b. Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, l.c.l., delivered	lb.	.07 / .08¼
Mark II, c.l., f.o.b. Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, l.c.l., delivered	lb.	.07 / .08¼
Standard, c.l., f.o.b. Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, l.c.l., delivered	lb.	.07 / .08¼
W-5, c.l., f.o.b., Gulf ports	lb.	.0445
c.l., delivered New York	lb.	$0.0535
local stock, l.c.l., delivered	lb.	.07 /$0.08¼
W-6, c.l., f.o.b., Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, l.c.l., delivered	lb.	.07 / .08¼
Pelletex	lb.	.03 / .07
Supreme, c.l., f.o.b. Gulf ports	lb.	.0445/ .0645
delivered New York	lb.	.0535/ .0735
l.c.l., delivered New York	lb.	.07 / .08¼
"WYEX BLACK"	lb.	
Carbonex	lb.	.03 / .0375
Carbonex "S"	lb.	.0315/ .04
Clays		
Aerfloted Paragon	ton	8.50
Suprex No. 1 Selected	ton	10.00
No. 2 Standard	ton	8.50
China	ton	17.50 /20.00
Dixie	ton	
Junior	ton	
McNamee	ton	
Par	ton	
Witco	ton	9.00
Cumar EX	lb.	.04

Reodorants

Amora A	lb.	
B	lb.	
C	lb.	
D	lb.	
Paradors	lb.	
Rodo No. 0	lb.	
No. 10	lb.	

Rubber Substitutes

Black	lb.	.07½/ .12½
Brown	lb.	.08½/ .14
White	lb.	.09 / .15

Softeners

Burgundy pitch	lb.	.06
Cycline oil	gal.	.15 / .28
Palm oil (Witco)	lb.	.06
Petrolatum, amber	lb.	.02½/ .03¼
light amber	lb.	.02¾/ .03½
Pine tar	gal.	
Plastogen	lb.	
Reogen	lb.	
Rosin oil, compounded	gal.	.40
RPA No. 1	lb.	
Rubtack	lb.	.10
Tackol	lb.	.085 / .18
Tonox	lb.	
Powder	lb.	
Witco No. 20	gal.	.15

Softeners for Hard Rubber Compounding

RSL Resin	lb.	.25 / .35
Resin C Pitch 55° C. M.P.	lb.	.0125/ .0145
Resin C Pitch 70° C. M.P.	lb.	.0125/ .0145
Resin C Pitch 85° C. M.P.	lb.	.0125/ .0145

Solvents

Beta-Trichlorethane	gal.	
Bondogen	lb.	
Carbon bisulphide	lb.	
tetrachloride	lb.	

Stabilizers for Cure

Laurex, ton lots	lb.	
Stearex B	lb.	.095 / .105
Beads	lb.	.10
Stearic acid, single pressed	lb.	.095 / .105
Stearite	100 lbs.	10.00 /10.80
Zinc stearate	lb.	.23

Synthetic Rubber

Neoprene Latex Type 50	lb.	
53	lb.	
54	lb.	
Type E	lb.	
"Thiokol" A (f.o.b. Yardville)	lb.	.35
Coating Materials		
C-1 Series	gal.	5.50
C-200 Series	gal.	3.75 / 4.25
D	lb.	.65
Molding Powder	lb.	.55 / .70

Tackifier

B. R. H. No. 2	lb.	.014 / .020

Varnish

Shoe	gal.	1.45

Vulcanizing Ingredients

Sulphur		
Chloride, drums	lb.	.03½/ .04
Rubber	100 lbs.	
Telloy	lb.	
Vandex	lb.	

(See also Colors—Antimony)

Waxes

Carnauba, No. 3 chalky	lb.	
2 N.C.	lb.	
3 N.C.	lb.	
1 Yellow	lb.	
2	lb.	
Montan, crude	lb.	

COTTON AND FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES

Futures	Oct. 31	Nov. 28	Dec. 5	Dec. 12	Dec. 19	Dec. 26
Nov.	11.63	.....	.....	.....	.....	.....
Dec.	11.63	11.91	12.20	12.67	.....	.....
Jan.	.....	11.77	12.02	12.45	12.20	12.40
Mar.	11.64	11.74	11.96	12.38	12.21	12.39
July	11.61	11.50	11.72	12.06	12.01	12.24
Sept.	11.29	11.30	11.40	11.56	11.80	12.02
Oct.	11.14	11.20	11.23	11.63	11.68	11.90

THE accompanying table gives the general trend of representative cotton futures for approximately the last two months. Spot middlings from 12.43¢ on December 1 advanced consistently with but two slight exceptions to the high of 13.03¢ on December 14, from which level it abruptly declined to 12.75¢ on December 17, followed immediately by a tendency to resume the upward movement.

The market on December 18 and 19 developed spot at 12.80¢, followed in the next two days by a net decline of 11 points to 12.71¢ on December 22. From that date on there was a heavy reaction upward carrying the price to a new high of 13.11¢ on December 28 set by foreign buying. The following day reactionary tendencies in other markets and rumors of possible releases of government-held cotton caused a break in prices, and spot sold at 12.95¢.

The Crop Reporting Board of the Department of Agriculture in its final estimate of cotton production of 1936 set the amount at 12,407,000 bales, an increase of 7,000 bales above the November estimate. Final totals of ginnings are reported in March and revised in May.

Following is quoted from the board's comment on its report.

"A United States cotton crop of 12,407,000 bales is estimated by the Crop Reporting Board of the United States Department of Agriculture, based upon indications as of December 1, 1936.

"This is practically unchanged from the November 1 forecast of 12,400,000 bales and compares with 10,638,000 bales in 1935, 9,636,000 bales in 1934, and 14,667,000 bales, the 5-year (1928-32) average. The indicated yield per acre for the United States of 197.6 pounds compares with 186.3 pounds in 1935 and 169.9 pounds, the 10-year (1923-32) average.

"Harvested acreage is now estimated at 30,054,000 acres, which is about 10 per cent greater than that harvested in 1935.

"Allowing for estimated abandonment of 2.8 per cent, the cotton acreage in cultivation on July 1 is indicated to have been 30,932,000 acres."

The Census Bureau of the Department of Commerce on December 14 reported consumption of all cotton in domestic mills during November at 626,695 bales. This is a record for ten years for cotton consumption in November.

Fabrics

Cotton textile markets are becoming firmer as to coarse cloth and the demand is broadening slowly but steadily. Forward production of many constructions is being absorbed into or through April, 1937. Fabric prices are advancing moderately under a persistent demand. Some difficulty is experienced in keeping cloth prices in step with raw material costs and other mill costs. There was a slight holiday lull, but the demand was sufficient to maintain prices well.

New York Quotations

December 26, 1936

Drills		
38-inch 2.00-yard	*yd.*	$0.15½
40-inch 3.47-yard		.10⅜
50-inch 1.52-yard		.21
52-inch 1.85-yard		.17⅞
52-inch 1.90-yard		.17¼
52-inch 2.20-yard		.15⅞
52-inch 2.50-yard		.14
59-inch 1.85-yard		.17¾
Ducks		
38-inch 2.00-yard D. F.	*yd.*	$0.15¼/.15½
40-inch 1.45-yard S. F.		.21
51½-inch 1.35-yard D. F.		.22¼
72-inch 1.05-yard D. F.		.30¾/.31½
72-inch 17.21-ounce		.32½
MECHANICALS		
Hose and belting	*lb.*	.30
TENNIS		
52-inch 1.35-yard	*yd.*	.23¾
***Hollands**		
GOLD SEAL		
20-inch No. 72	*yd.*	.11
30-inch No. 72		.20
40-inch No. 72		.22
RED SEAL		
20-inch	*yd.*	.09⅝
30-inch		.18
40-inch		.19¼
50-inch		.27
Osnaburgs		
40-inch 2.34-yard	*yd.*	.12 /.12⅞
40-inch 2.48-yard		.11¼/.12⅛
40-inch 2.56-yard		.10⅞
40-inch 3.00-yard		.10⅛
40-inch 7-ounce part waste		.10⅝
40-inch 10-ounce part waste		.14⅞
37-inch 2.42-yard		.12⅝
Raincoat Fabrics		
COTTON		
Bombazine 60 x 64	*yd.*	.11¼
Plaids 60 x 48		.12¾
Surface prints 60 x 64		.13¾
Print cloth, 38¼-inch, 60 x 64		.08
SHEETINGS, 40-INCH		
48 x 48, 2.50-yard	*yd.*	.11½
64 x 68, 3.15-yard		.11¼
56 x 60, 3.60-yard		.09½
44 x 40, 4.25-yard		.07½
SHEETINGS, 36-INCH		
48 x 48, 5.00-yard	*yd.*	.07¼
44 x 40, 6.15-yard		.06⅜
Tire Fabrics		
BUILDER		
17¼ ounce 60" 23/11 ply Karded peeler	*lb.*	.33
CHAFER		
14 ounce 60" 20/8 ply Karded peeler	*lb.*	.30
9¼ ounce 60" 10/2 ply Karded peeler	*lb.*	.31
CORD FABRICS		
23/5/3 Karded peeler, 1 1/8" cotton	*lb.*	.31
15/3/3 Karded peeler, 1 1/8" cotton	*lb.*	.29
23/5/3 Karded peeler, 1¼" cotton	*lb.*	.34
23/5/3 Combed Egyptian	*lb.*	.47
LENO BREAKER		
8¼ ounce and 10¼ ounce 60" Karded peeler	*lb.*	.31

RUBBER SCRAP

THE demand for all grades of rubber scrap is active. Consumption is increasing, and the market is advancing on approximately half the grades. With the exception of waste paper, scrap rubber tires are the lowest priced commodity on the scrap market. Owing to the bulkiness of old tires, collectors are not anxious to collect them at the prices which have existed. From November 26 to December 26 current quotations have advanced very materially on mixed auto tires, No. 1 hard rubber, hose, and black scrap; while the advance in quotations on black boots and shoes, red tubes, mixed tubes, and No. 2 compounded tubes has been much less. Other items have remained the same as on November 25.

CONSUMERS' BUYING PRICES

(Carload Lots Delivered Eastern Mills)

December 26, 1936

		Prices
Boots and Shoes		
Boots and shoes, black	*lb.*	$0.01¼/$0.01⅜
Colored	*lb.*	.00⅞/ .01
Untrimmed arctics	*lb.*	.00⅞/ .01
Inner Tubes		
No. 1, floating	*lb.*	.11 / .11½
No. 2, compound	*lb.*	.05 / .05¼
Red	*lb.*	.05 / .05¼
Mixed tubes	*lb.*	.04⅞/ .05
Tires (Akron District)		
Pneumatic Standard		
Mixed auto tires with beads	*ton*	12.00 /13.00
Beadless	*ton*	16.50 /17.50
Auto tire carcass	*ton*	17.00 /18.00
Black auto peelings	*ton*	16.00 /17.00
Solid		
Clean mixed truck	*ton*	31.50 /33.00
Light gravity	*ton*	36.00 /37.00
Mechanicals		
Mixed black scrap	*ton*	25.00 /30.00
Hose, air brake	*ton*	25.00 /30.00
Garden, rubber covered	*ton*	16.50 /18.00
Steam and water, soft	*ton*	16.50 /18.00
No. 1 red	*lb.*	.03 / .03¼
No. 2 red	*lb.*	.02¾/ .03
White druggists' sundries	*lb.*	.04½/ .05
Mechanical	*lb.*	.03¾/ .04
Hard Rubber		
No. 1 hard rubber	*lb.*	.14 / .15

OHIO

(*Continued from page* 68)

Nils Florman, president and general manager of National Rubber Machinery Co., engineer and manufacturer of special machinery and equipment, Akron, has established residence in Akron at the Seville Apartments.

The Oak Hill Rubber Co., Oak Hill, supplies cut, died, and molded sponge, molded specialties, sheet sponge rubber, bath sponges, and "Rest Assured" chair cushions. Company executives follow: W. A. Byrider, president; L. P. Waldron, vice president and general manager; and W. A. Byrider, Jr., secretary-treasurer.

SHAWMUT
HOSE AND BELTING DUCK

SHAWMUT B 32

Fabrics for the Rubber Industries

We can give positive assurance of the performance of these famous industrial sheetings and hose and belting ducks. Our modern textile laboratories are available to assist rubber manufacturers in the development of fabrics to meet new industrial requirements.

52" 3.85 YD. 48 x

" 3.60 YD. 60 x 56 SHAWMUT B 42-9 40" 4.00 YD. 60 x 2 SHAWMUT A 14

WELLINGTON SEARS CO.

65 WORTH STREET NEW YORK CITY

COLUMBUS SHEETINGS

60" 3.90 YD. 40 x 40

Editor's Book Table

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BOOK REVIEWS

"Memento de L'Industrie du Caoutchouc (Accélérateurs—Antioxydants—Colorants—Solvants—Agents Divers—Résines, Etc.)." By F. Jacobs, Société d-Éditions Techniques Cillard, 49 Rue des Vinaigriers, Paris (X^{e}), France. 1936. Paper, 450 pages, 5¼ by 8¼ inches. Indexed. Postpaid France 67 francs, abroad 70 francs.

This work, which forms part of the "Encyclopédie du Caoutchouc et des Matières Plastiques," comprises the following chapters: I. Accelerators; II. Antiscorchers—Retarders—Vulcanizers; III. Antiagers; IV. Colors and Pigments; V. Waxes, Plastifiers—Fat Substances—Solvents; VI. Wetting Agents, Emulsifiers, Stabilizers, Thickeners; VII. Synthetic Resins—Synthetic Rubber. For each of these products the author indicates the composition, the properties, the effect in the rubber, and the detailed method of use.

The systematic description of the compounding ingredients given is a close approximation of the plan employed in the series of articles published in 1935 by INDIA RUBBER WORLD, and since issued in book form, entitled "Compounding Ingredients for Rubber."

Included in the list of principal manufacturers of the materials described are a number of American concerns that are no longer in business or have withdrawn as suppliers of products to the rubber industry. The reference value of the volume is seriously impaired by failure to cross index the contents for identification of the dealers and their products. Notwithstanding these defects the volume is a valuable guide to the materials available in Europe to rubber chemists and technologists.

Gummi-Zeitung commemorating its fiftieth anniversary, has issued a jubilee number handsomely illustrated and worthy of the occasion. Among the various articles it contains are "German Rubber Goods on the World Market—50 Years of Rubber Goods Exports," by Ernst Schultze; "The Development of the Artificial Materials Industry," A. Herz; "The Development of the *Gummi-Zeitung,* (German and English versions of the German rubber industry in the 50 years 1886-1936,") by Dr. Kurt Maier; "The Development of Synthetic Rubber in Germany," by E. Konrad; and German and French versions of "Technical Progress in the Rubber Industry." We congratulate our contemporary in Germany and wish it many more years of useful and prosperous activity.

"A.S.T.M. Standards on Textile Materials. Prepared by Committee D-13 on Textile Materials. Specifications, Tolerances, Methods of Testing, Definitions and Terms. October, 1936." Published by the American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa. Paper, 302 pages, 6 by 9 inches. Price $2.

To make available in latest approved form all 42 A.S.T.M. standards covering various types of textile products the society has issued a revised and amplified edition of this publication. Besides all A.S.T.M. standards on textiles, included are a proposed potassium dichromate oxidation method to determine total iron in asbestos textiles, a psychrometric table for relative humidity which combines both accuracy and convenience to an exceptional degree, a section comprising many excellent photomicrographs of common textile fibers, a convenient yarn number conversion table, and proposed methods covering testing wool felt and correction of breaking strength to standard regain.

During the past year nine outstanding technical papers were presented at meetings of Committee D-13 and extensive abstracts of these papers are given in the publication.

The 1936 edition contains for the first time new methods of testing applying to pile floor covering; fineness of wool; corded cotton gray goods; yarn slippage in silk, rayon, and silk-rayon woven broad goods; and fastness to laundering or domestic washing of dyed or printed cotton fabrics and printed silk or rayon fabrics.

During 1935-1936 changes have been made in standards covering woolen and worsted yarns, definitions and terms, silk and cotton tapes, and test for small amounts of copper and manganese in textiles; also, cotton yarns, cotton sewing threads, asbestos tape, cotton tape, light and medium cotton fabrics, hose and belt ducks, and methods of testing woven fabrics.

In addition to the above materials a large number of other textile products are covered, including: testing machines, tire fabrics, tire cord, sewing threads, numbered ducks, knit goods, rayon, fabrics (identification), sleeving and braids, Holland cloth, corded cotton goods, and sugar bags.

"Agitator and Mixer Book." The Patterson Foundry & Machine Co., East Liverpool, O. This catalog, No. 375, is copiously illustrated with mixing equipment, agitators, process kettles, pebble mills, etc., employed in the process industries. Included among the many special items shown are cement churns, compounding ingredient mixers and revolving screens, also pebble mills for colloidal grinding, all of which find a place in the rubber industry.

NEW PUBLICATIONS

"The Vanderbilt News." R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. The November-December, 1936, issue comprises, as usual, valuable information for the compounder on the value of using Tuads as the vulcanizing agent to attain the highest degree of heat resistance in a rubber stock. Equally interesting are the papers on "The Compounding Characteristics of Vanderbilt Clays," "Examples of the Use of Clays in Compounding," and "The Compounding Characteristics of Various Types of Carbon Blacks." The test data are tabulated and also displayed in numerous graphs.

This issue completes the sixth volume of this enterprising magazine on rubber compounding and is accompanied by a separately bound "Index to Volumes 1 to 6 inclusive, 1931-1936, of 'The Vanderbilt News.'" The index is uniform in size for binding with the magazine. This valued feature will be much appreciated as a guide to a great store of information on advanced compounding practice for rubber.

"Goodrich Batteries." The B. F. Goodrich Co., Akron, O. This 24-page booklet is a brief presentation featuring the famous "Electro-Pak" embodied in the 1936-1937 line of Goodrich batteries for trucks and buses. Construction features of every type are described and pictured, together with complete specifications on the product. Three pages are devoted to a discussion of battery power requirements, and seven to replacement data on batteries for trucks, buses, fire apparatus, tractors, and hearses.

"Thiokol Facts." Thiokol Corp., Yardville, N. J., No. 4 of this four-page leaflet contains an illustrated descriptive article on the application of "Thiokol" in the manufacture of solvent resisting hose for spraying fluids, for pipe joint gaskets, sheathing rubber lined pickling tanks, and in non-cracking joints of highways.

"Givaudanian." Givaudan - Delawanna, Inc., Industrial Aromatics Division, 80 Fifth Ave., New York, N. Y. The November, 1936, issue discusses editorially the marked tendency in industry to improve the odor of products where until recently there was unalterable opposition to doing so.

"Yarway Forged Steel Blow-off Valves." Yarnall-Waring Co., Chestnut Hill, Philadelphia, Pa. This four-page bulletin (B-419) illustrates and describes a line of blow-off valves for 600 to 1,500 pounds' working pressures.

"Tag Oil Testing Instruments for Petroleum Products. Catalog No. 699D." C. J. Tagliabue Mfg. Co., Brooklyn, N. Y. This bulletin is descriptive of essential apparatus for the oil chemist and technologist.

"What Gastex Offers to the Inner Tube Manufacturer." General Atlas Carbon Co., 60 Wall St., New York, N. Y. In this folder addressed to the manufacturers of inner tubes the importance is stressed of the physical properties desirable in their products and how to secure them.

"Processing Kettles." By W. Maynard McConnell, chemical engineer, The Patterson Foundry & Machine Co., E. Liverpool, O. This brief treatise on the construction and operation of processing kettles discusses the electrically heated, gas fired and steam, hot oil and water jacketed types as used in the manufacture of synthetic resins and varnish and in the chemical and food industries.

"Annual Report of the Insular Collector of Customs, For Fiscal Year Ending Dec. 31, 1935." Commonwealth of the Philippines, Department of Finance, Bureau of Customs. Manila Bureau of Printing. Paper, 371 pages, 5¾ by 9 inches. Indexed. This volume comprises the classified statistical record of commerce of the Philippines under the general divisions of products, imports, and exports.

"Witcombings." Wishnick-Tumpeer, Inc., 295 Madison Ave., New York N. Y. The December issue is a "Good Cheer" number replete with news items of interest to the rubber trade. Also given is a statistical article on the carbon black industry.

"Edge Moor Steam Generating Equipment." Edge Moor Iron Works, Edge Moor, Del. This catalog, No. 102, illustrates bent tube boilers of the three and four drum type, and horizontal type, also the straight tube and long drum types, air preheaters, etc. Many typical installations are shown in sectional views.

"Modern Chemicals from Oils and Fats." Woburn Degreasing Co. of N. J. Chemical Division, Harrison, N. J. This is tabulation of the chemical characteristics and principal uses of 42 fatty acids and other products serving many industries including rubber.

"Sharing Profits with Employees." Metropolitan Life Insurance Co., One Madison Ave., New York, N. Y. This 28-page report describes the different types of profit sharing plans, outlines their historical background, and discusses their purposes and theories. It then takes up the details of organizing and administering a program covering such subjects as eligibility for participation, the amount of profits to be shared, the basis of distribution, the form and time of distribution, etc. Case histories of several typical plans in use today are given in detail. A copy can be obtained free from the Policyholders Service Bureau of the insurance company.

Tire Production Statistics

	Pneumatic Casings—All Types		
	Inventory	Production	Total Shipments
1934	9,454,985	47,232,748	46,686,545
1935	8,195,863	49,361,781	50,183,129
1936			
Jan.	8,916,673	4,578,179	3,874,523
Feb.	9,263,261	3,577,103	3,210,789
Mar.	9,085,790	3,637,625	3,855,527
Apr.	9,032,925	4,853,346	4,901,895
May	8,174,806	4,970,388	5,831,641
June	7,831,474	5,609,095	5,791,579
July	7,746,388	5,464,927	5,743,863
Aug.	7,793,438	5,014,415	4,976,383
Sept.	9,005,065	4,981,131	3,835,998
Oct.	10,088,510	5,123,467	4,081,023
	Inner Tubes—All Types		
1934	9,179,893	46,227,807	45,045,495
1935	8,231,351	47,879,034	48,066,904
1936			
Jan.	8,622,522	4,591,791	4,167,711
Feb.	8,699,228	3,556,098	3,445,767
Mar.	8,691,651	3,787,226	3,795,505
Apr.	8,788,043	4,824,199	4,746,265
May	8,719,467	4,818,960	4,918,715
June	8,104,830	5,034,595	5,503,564
July	7,724,790	5,177,430	5,758,273
Aug.	7,620,573	5,038,785	5,136,005
Sept.	8,626,648	5,160,815	4,230,546
Oct.	9,976,583	5,397,089	4,107,784
	Solid and Cushion Tires		
1934	34,710	197,497	187,152
1935	46,406	283,606	275,741
1936			
Jan.	40,193	25,443	22,670
Feb.	.....	14,730	17,172
Mar.	.....	16,004	21,350
Apr.	.....	32,807	32,611
May	.....	29,674	30,378
June	.....	36,856	35,617
July	.....	38,904	34,445
Aug.	.....	33,649	28,174
Sept.	.....	40,801	36,312
Oct.	.....	43,601	54,741

	Cotton and Rubber Consumption Casings, Tubes, Solid and Cushion Tires		Consumption of Motor Gasoline (100%) Gallons
	Cotton Fabric Pounds	Crude Rubber Pounds	
1934...	196,069,495	697,558,218	17,063,298,000
1935...	202,318,119	756,773,779	18,167,352,000
1936			
Jan....	15,987,906	61,457,999	1,367,226,000
Feb....	12,059,051	45,839,772	1,150,842,000
Mar...	13,416,664	47,872,526	1,506,582,000
Apr....	16,570,836	64,211,819	1,630,650,000
May...	17,098,812	66,119,211	1,764,294,000
June..	18,494,366	69,251,427	1,874,460,000
July...	18,250,725	69,637,586	1,961,064,000
Aug...	17,151,577	64,998,596	1,935,402,000
Sept...	16,988,854	63,671,252	1,862,532,000
Oct....	17,569,100	66,260,974	1,858,626,000

Rubber Manufacturers Association, Inc., figures representing approximately 97% of the industry for 1934 and 1935, 81% for 1936, and 80% for previous years, with the exception of gasoline consumption.

United States Latex Imports

Year	Pounds	Value
1934	29,276,134	$3,633,253
1935	30,358,748	3,782,222
1936		
Jan.	3,733,665	474,682
Feb.	3,268,542	406,985
Mar.	3,196,083	417,704
Apr.	3,610,511	522,049
May	3,296,351	490,769
June	4,250,178	657,311
July	3,729,418	579,895
Aug.	3,944,962	602,992
Sept.	4,031,355	692,810
Oct.	3,117,748	500,817

Data from Leather and Rubber Division, United States Department of Commerce, Washington, D. C.

Rubber Trade Inquiries

The inquiries that follow have already been answered; nevertheless they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The Editor is therefore glad to have those interested communicate with him.

No.	Inquiry
2226	Manufacturer of rubber sheeting.
2227	Manufacturer of molded rubber covers to fit on glass hospital jars and enamel pitchers.
2228	Manufacturer of Fabricushion Carpet Rubber Matting.
2229	Supplier of containers for liquid centers for golf balls, or the container filled with liquid complete.
2230	Manufacturer of rubber jar rings.
2231	Supplier of "L L R," a Liquid Live Rubber.
2232	Importer of crude rubber.
2233	Manufacturers of rubber molds.
2234	Manufacturer of wood and steel used for cutting dies for use in trimming rubber goods.
2235	Manufacturer of machinery for making canvas rubber-soled footwear.

Exports from Brazil

Crude rubber exports from Brazil the first nine months of 1936 were 9,625 long tons, 25% more than the 7,724 tons for the same period of 1935 and 60% more than that of 6,011 for the 1934 months. Although Brazil, the original home of the *Hevea brasiliensis*, supplies only about 1.5% of the total annual rubber supply, greater exports in 1936 indicate higher prices eventually affect the production of native crops. If the rate of exports continued through the remaining three months, Brazil will have contributed over 12,800 long tons of rubber to the world's rubber manufacturing industry in 1936.

British Malaya

An official cable from Singapore to the Malayan Information Agency, Malaya House, 57 Trafalgar Sq., London, W.C.2, England, gives the following figures for November, 1936:

Rubber Exports: Ocean Shipments from Singapore, Penang, Malacca, and Port Swettenham

To	Sheet and Crepe Rubber Tons	Latex, Concentrated Latex, Revertex, and Other Forms of Latex Tons
United Kingdom	1,804	340
United States	30,471	612
Continent of Europe	4,904	295
British possessions	2,059	76
Japan	5,920	42
Other countries	812	7
Totals	45,970	1,372

Rubber Imports: Actual, by Land and Sea

From	Dry Rubber Tons	Wet Rubber (Dry Weight) Tons
Sumatra	7,875	520
Dutch Borneo	3,058	..
Java and other Dutch islands	147	..
Sarawak	2,038	..
British Borneo	345	20
Burma	426	4
Siam	1,712	337
French Indo-China	98	200
Other countries	129	14
Totals	15,828	1,095

U. S. Crude and Waste Rubber Imports for 1936

	Plantations	Latex	Paras	Africans	Centrals	Guayule	Manicoba and Matto Grosso	Totals 1936	Totals 1935	Balata	Miscellaneous	Waste
Jan. ....tons	29,130	1,263	597	167	65	70	..	31,292	42,059	20	870	122
Feb.	33,203	1,146	550	217	28	75	..	35,219	35,383	95	665	184
Mar.	35,675	1,296	390	35	15	40	..	37,451	44,041	60	620	142
Apr.	38,286	1,324	559	75	21	105	..	40,370	43,545	167	1,013	456
May	34,048	1,033	342	79	10	86	..	35,598	26,766	146	391	224
June	39,900	1,534	226	58	20	97	..	41,835	38,340	88	662	126
July	34,277	1,244	233	25	6	96	..	35,881	46,880	66	821	95
Aug.	40,742	1,486	50	126	12	146	..	42,562	38,655	142	523	155
Sept.	46,515	1,394	210	80	81	106	..	48,386	34,569	98	514	212
Oct.	38,508	1,980	175	42	101	114	..	40,920	34,356	21	462	149
Nov.	42,621	1,037	308	54	117	159	..	44,296	28,826	34	632	214
Total, 11 mos., 1936 ....tons	412,905	14,737	3,640	958	476	1,094	..	433,810	.....	937	7,173	2,079
Total, 11 mos., 1935 ....tons	397,195	10,165	4,656	708	273	423	..	.....	413,420	678	5,411	314

Compiled from The Rubber Manufacturers Association, Inc., statistics.

Shipments of Crude Rubber from Producing Countries

Year	Malaya including Brunei and Labuan	N.E.I.	Ceylon	India	Burma	North Borneo	Sarawak	Siam	French Indo-China	Philippines and Oceania Total	Oceania	Africa	South America	Mexican Guayule	Grand Total
1934	467,400	379,400	79,100	6,500	6,300	11,100	17,700	17,700	19,600	1,004,800	1,400	3,500	9,100	400	1,019,200
1935	417,005	282,858	54,316	9,054	4,914	8,885	19,465	28,327	28,677	853,501	1,537*	5,031	12,194	459	872,722
1936															
Jan.	26,637	20,778	4,178	419	880	938	2,317	1,665	2,449	60,261	105	494	1,796	70	62,726
Feb.	19,692	27,991	3,664	871	511	529	2,107	3,663	2,894	61,922	225	620	1,177	75	64,019
Mar.	34,597	19,403	4,336	750	574	342	1,848	2,966	2,553	67,369	133	535	1,175	40	69,252
Apr.	21,667	25,255	3,172	413	817	869	2,053	1,596	2,416	58,258	92	533	1,044	103	60,030
May	34,108	22,121	2,560	632	485	517	2,354	2,077	2,281	67,135	103	493	1,018	88	68,837
June	25,115	26,401	3,766	673	553	461	1,386	3,737	2,733	64,825	153	456	947	97	66,478
July	34,214	33,911	3,773	1,048	311	1,035	1,399	3,734	2,738	82,163	155	423	1,013	96	83,850
Aug.	30,253	25,289	3,940	655	121	656	2,541	3,284	3,017	69,756	160	483	569	146	71,116
Sept.	34,160	21,834	5,367	609	76	537	1,139	3,259	3,505	70,486	164	500*	1,070	106	72,326
Oct.	33,735	27,315	5,623	828	372	1,086	2,143	3,349	3,874	78,325	160*	550*	1,287	100*	80,422

*Estimate. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

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Light face type $1.00 per line (ten words)	Light face type 40c per line (ten words)	Light face type 75c per line (ten words)
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SITUATIONS WANTED

EXECUTIVE NOW EMPLOYED DESIRES TO MAKE CHANGE. Thoroughly familiar with manufacturing of all types of belting, packing, hose, flooring, hard and soft rubber, molded and lathe-cut goods, druggists' sundries, and general development work. Competent to train inexperienced help and develop formulas. Best of references. Address Box No. 754, care of INDIA RUBBER WORLD.

SUPERINTENDENT OR FOREMAN, YEARS OF EXPERIENCE rubberizing all kinds of fabric, both calendered and spread, single or double texture, suede, quarter lining, auto topping, luggage and bag cloth, leatherette and raincoat material. Complete knowledge of compounds. Will go any part of U.S.A. or Canada. Address Box No. 757, care of INDIA RUBBER WORLD.

SUPERINTENDENT—AGE 39, 18 YEARS' EXPERIENCE MANUfacturing mechanical molded goods and extruded products, both hard and soft rubber, good production and personnel manager, desires new connection. Address Box No. 759, care of INDIA RUBBER WORLD.

RUBBER CHEMIST—M.I.T. GRADUATE. EIGHT YEARS' EXperience compounding, development, research. Mechanicals, thread, latex dipped goods. Address Box No. 764, care of INDIA RUBBER WORLD.

SITUATIONS OPEN

SUPERINTENDENT FAMILIAR WITH COPPER ROD AND wire drawing, tinning, stranding, rubber mixing, tubing, stripping, pan and drum vulcanizing, taping, braiding, finishing, cabling and leading for electric wire factory. Address Box No. 755, care of INDIA RUBBER WORLD.

FACTORY SUPERINTENDENT AND MANAGER FOR TIRE FACtory in Czechoslovakia. Complete knowledge of all details of manufacture of high-pressure tires of world standard quality, construction, compound, vulcanization in watch-molds. Ability to manage plant with daily output of 500 pieces. Give complete scholastic record, personal history, industrial experience, salary. References required. Write Ferd Jirsa, Society for Savings Bldg., Cleveland, Ohio.

WANTED: RUBBER CHEMIST WITH TIRE COMpounding experience and fully experienced in laboratory testing procedure. For carbon black laboratory in Texas. State education, experience, and salary desired in first letter. Address Box No. 761, care of INDIA RUBBER WORLD.

(*Advertisements continued on page 93*)

United States Statistics

Imports for Consumption of Crude and Manufactured Rubber

	September, 1936		Nine Months Ended September, 1936	
UNMANUFACTURED—*Free*	Pounds	Value	Pounds	Value
Crude rubber	108,042,403	$16,644,668	764,391,915	$108,051,769
Liquid latex	4,031,355	692,810	33,061,065	4,845,197
Jelutong or pontianak	935,446	85,624	10,678,347	993,133
Balata	57,266	9,846	1,045,944	167,898
Gutta percha	340,468	49,482	2,782,951	449,119
Guayule	238,100	29,335	1,840,500	174,111
Siak, scrap, reclaimed, etc.	1,157,919	20,461	10,116,402	224,921
Totals	114,802,957	$17,532,226	823,917,124	$114,906,148
Chicle, crude *Free*	141,443	$32,126	5,278,737	$1,266,922
MANUFACTURED—*Dutiable*				
Rubber tires *number*	4,979	$8,433	59,736	$319,901
Rubber boots, shoes, and overshoes *pairs*	5,558	731	47,778	9,335
Rubber soled footwear with fabric uppers *pairs*	79,327	19,739	825,247	188,217
Golf balls *number*	25,200	4,077	493,170	78,509
Lawn tennis balls *number*	3,768	545	389,515	39,147
Other rubber balls *number*	250,451	7,371	3,882,209	122,469
Other rubber toys, except balls	120,228	14,228	910,083	108,998
Hard rubber combs *number*	98,814	5,978	658,280	38,693
Other manufactures of hard rubber	.....	1,589	.....	21,691
Friction or insulating tape	33,469	1,691	236,261	11,890
Belts, hose, packing, and insulating material	.....	22,208	.....	163,454
Druggists' sundries of soft rubber	.....	8,388	.....	66,116
Inflatable swimming belts, floats, etc. *number*	.....	.....	652,898	35,348
Other rubber and gutta percha manufactures	118,422	21,747	1,130,439	205,488
Totals	.....	$116,725	.....	$1,409,256

Exports of Foreign Merchandise

RUBBER AND MANUFACTURES				
Crude rubber	1,469,461	$244,554	23,409,889	$3,709,851
Balata	25,379	7,737	186,470	49,999
Gutta percha, rubber substitutes, and scrap	1,662	1,088	102,942	7,764
Rubber manufactures	.....	884	.....	12,345
Totals	.....	$254,263	.....	$3,779,959

Exports of Domestic Merchandise

RUBBER AND MANUFACTURES				
Reclaimed	1,301,308	$56,840	11,812,069	$533,629
Scrap	2,131,695	42,440	32,353,393	590,699
Cements *gal.*	16,287	12,352	163,170	136,792
Rubberized automobile cloth, *sq. yd.*	32,739	17,686	377,351	175,679
Other rubberized piece goods and hospital sheeting *sq. yd.*	95,064	40,194	903,031	365,125
Footwear				
Boots *pairs*	5,176	10,975	54,915	121,229
Shoes *pairs*	22,181	9,205	182,294	72,677
Canvas shoes with rubber soles *pairs*	16,439	8,965	157,203	92,451
Soles *doz. prs.*	3,353	5,904	19,768	35,621
Heels *doz. prs.*	34,339	21,720	312,751	196,484
Soling and top lift sheets	30,125	6,144	289,275	58,428
Gloves and mittens *doz. prs.*	4,803	11,007	44,094	100,022
Water bottles and fountain syringes *number*	31,398	11,131	195,683	70,972
Other druggists' sundries	.....	48,217	.....	383,531
Gum rubber clothing *doz.*	16,234	26,638	110,180	178,918
Balloons *gross*	41,299	40,707	243,976	230,365
Toys and balls	.....	20,292	.....	81,511
Bathing caps *doz.*	3,018	4,631	50,582	82,979
Bands	15,483	5,569	176,786	63,386
Erasers	23,960	13,817	273,046	157,440
Hard rubber goods				
Electrical hard rubber goods	.....	21,560	.....	159,925
Other hard rubber goods	.....	28,659	.....	194,491
Tires				
Truck and bus casings, *number*	21,119	478,228	137,292	2,674,402
Other automobile casings, *number*	59,225	606,989	520,015	4,774,634
Tubes, auto *number*	52,116	87,948	473,369	728,041
Other casings and tubes, *number*	5,867	17,616	38,805	163,218
Solid tires for automobiles and motor trucks *number*	266	8,522	3,699	101,568
Other solid tires	90,705	14,362	872,689	135,609
Tire sundries and repair materials	.....	56,313	.....	447,176
Rubber and friction tape	51,988	16,590	512,677	139,952
Belts and belting	250,922	126,326	1,949,957	1,018,649
Hose	457,419	146,967	3,608,495	1,270,396
Packing	137,596	61,094	1,083,389	460,853
Mats, matting, flooring, and tiling	106,846	13,763	1,098,317	151,829
Thread	57,402	29,624	627,799	370,212
Gutta percha manufactures	203,062	51,053	741,553	198,885
Other rubber manufactures	.....	79,029	.....	813,228
Totals	.....	$2,259,077	.....	$17,531,006

Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	September, 1936		Six Months Ended September, 1936	
UNMANUFACTURED	Pounds	Value	Pounds	Value
Crude rubber, etc.	5,361,220	$848,457	30,887,289	$4,793,648
Gutta percha	2,551	378	8,063	3,727
Rubber, recovered	900,500	40,424	5,004,700	218,523
Rubber, powdered, and gutta percha scrap	351,100	7,812	2,131,100	31,547
Balata	2,748	664	8,664	2,412
Rubber substitute	43,000	12,767	212,800	63,681
Totals	6,661,119	$910,502	38,252,616	$5,113,538
PARTLY MANUFACTURED				
Hard rubber comb blanks	.....	$138	.....	$1.105
Hard rubber	2,434	728	33,659	20,944
Hard rubber tubes	.....	44	.....	1,851
Rubber thread not covered	3,552	2,163	20,911	13,749
Totals	5,986	$3,073	54,570	$37,649
MANUFACTURED				
Belting	.....	$9,650	.....	$47,869
Hose	.....	4,597	.....	40,303
Packing	.....	4,167	.....	28,845
Boots and shoes *pairs*	1,951	1,280	79,985	22,720
Canvas shoes with rubber soles *pairs*	.....	.....	110,295	39,410
Clothing, including waterproofed	.....	1,458	.....	13,218
Raincoats *number*	1,132	4,284	7,994	24,234
Gloves *dozen pairs*	136	372	1,772	4,337
Hot water bottles	.....	2,170	.....	8,747
Liquid rubber compound	.....	2,405	.....	15,174
Tires, bicycle *number*	2,267	908	40,112	15,806
Pneumatic *number*	1,198	11,270	9,520	98,963
Inner tubes *number*	206	379	3,159	6,368
Solid for automobiles and motor trucks *number*	40	1,822	139	4,756
Other solid tires	.....	1,034	.....	5,235
Mats and matting	.....	2,868	.....	33,356
Cement	.....	4,476	.....	35,361
Golf balls *dozens*	1,326	3,020	26,496	67,909
Heels *pairs*	7,781	491	36,860	2,021
Other rubber manufactures	.....	74,112	.....	518,761
Totals	.....	$130,763	.....	$1,033,393
Totals, rubber imports	.....	$1,044,338	.....	$6,184,580

Exports of Domestic and Foreign Rubber Goods

UNMANUFACTURED	Produce of Canada Value	Reexports of Foreign Goods Value	Produce of Canada Value	Reexports of Foreign Goods Value
Waste rubber	$10,370	.....	$58,356	.....
MANUFACTURED				
Belting	51,137	.....	$278,544	.....
Canvas shoes with rubber soles	34,255	.....	593,440	.....
Boots and shoes	512,216	.....	1,800,733	.....
Clothing, including waterproofed	23,030	.....	144,073	.....
Heels	19,326	.....	87,473	.....
Hose	26,084	.....	110,447	.....
Soles	23,645	.....	81,089	.....
Tires, pneumatic	475,248	.....	3,238,737	.....
Not otherwise provided for	42	.....	67	.....
Inner tubes	37,349	.....	280,057	.....
Other rubber manufactures	67,241	$1,017	307,048	$7,776
Totals	$1,269,573	$1,017	$6,921,708	$7,776
Totals, rubber exports	$1,279,943	$1,017	$6,980,064	$7,776

Imports by Customs Districts

	October, 1936 *Crude Rubber		October, 1935 *Crude Rubber	
	Pounds	Value	Pounds	Value
Massachusetts	8,963,300	$1,460,378	3,964,158	$447,846
St. Lawrence	1,303	189	.....	.....
New York	65,425,758	10,181,864	63,398,365	7,079,363
Philadelphia	1,809,974	285,814	185,350	21,993
Maryland	2,387,441	375,777	1,591,183	178,271
Mobile	.....	.....	1,119,034	115,649
Georgia	889,830	141,205	.....	.....
New Orleans	2,314,667	361,366	1,172,081	123,781
Los Angeles	9,412,587	1,237,109	9,753,955	1,083,340
San Francisco	525,626	79,287	56,000	6,160
Oregon	.....	.....	16,800	1,992
Washington	.....	.....	5,600	700
Michigan	.....	.....	224,000	25,200
Ohio	286,026	36,782	160	28
Totals	92,016,512	$14,159,771	81,486,686	$9,084,323

*Crude rubber including latex dry rubber content.

Classified Advertisements

Continued

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FOR SALE: DIPPING MACHINES, CHURNS, BALLOON AND glove forms, and accessory equipment, all modern and up-to-date equipment. Offered in whole or part at attractive prices for prompt disposal. Address Box No. 756, care of INDIA RUBBER WORLD.

FOR SALE—ONE 40", ONE 42" THROPP WARMING MILL. PERfect condition, ideal for reclaiming or any rubber manufacture; also one hydraulic pump for accumulator. Address Box No. 762, care of INDIA RUBBER WORLD.

FINAL LIQUIDATION OF EQUIPMENT AT MURRAY RUBBER CO., TRENTON, N. J.
1 Farrel 3-roll 66" Calender; 1 400 H.P. Thropp herringbone reduction gear drive; 1 250 H.P. Chain Drive; 1 72" Mill; 1 Thropp 6" by 16" Experimental Mill; 1 No. 4 Royle Tuber, motor drive; 1 30" by 52' Vulcanizer, with quick opening door. Miscellaneous: Compressors; Hoists; Laboratory Equipment; Magnetic Pulleys; Scales; Trucks; etc. REPRESENTATIVE ON PREMISES. ARRANGE FOR INSPECTION. PRICED LOW FOR QUICK REMOVAL. CONSOLIDATED PRODUCTS CO., INC., 13-16 Park Row, New York, N. Y. Barclay 7-0600.

(*Advertisements continued on page 95*)

Rubber Questionnaire

Third Quarter, 1936*

Reclaimed Rubber	Long Tons: Inventory at End of Quarter	Production	Shipments	Consumption
Reclaimers solely (6)	3,645	16,583	17,331	.....
Manufacturers who also reclaim (16)	5,477	13,077	1,372	11,243
Other manufacturers (99)	4,014	.....	.....	13,151
Totals	13,136	29,660	18,703	24,394

Scrap Rubber	Long Tons: Inventory	Consumption	Due on Contracts
Reclaimers solely (6)	30,317	18,558	13,695
Manufacturers who also reclaim (15)	23,116	15,183	6,443
Other manufacturers (15)	184	.....	.....
Totals	53,617	33,741	20,138

Tons of Rubber Consumed in Rubber Products and Total Sales Value of Shipments

Products	Rubber Consumed Long Tons	Total Sales Value of Shipments of Manufactured Rubber Products
Tires and Tire Sundries		
All types pneumatic casings (except bicycle, airplane)	76,064	$78,804,000
All types pneumatic tubes (except bicycle, airplane)	11,276	11,229,000
Bicycle tires, including juvenile pneumatics (single tubes, casings, and tubes)	1,056	1,695,000
Airplane tires and tubes	39	156,000
Solid and cushion tires for highway transportation	131	309,000
All other solid and cushion tires	235	386,000
Tire sundries and repair materials	2,032	2,904,000
Totals	90,833	$95,483,000
Other Rubber Products		
Mechanical rubber goods	10,310	$26,460,000
Boots and shoes	5,392	18,454,000
Insulated wire and cable compounds	1,592	†
Druggists' sundries, medical and surgical rubber goods	780	2,522,000
Stationers' rubber goods	447	584,000
Bathing apparel	196	184,000
Miscellaneous rubber sundries	762	1,216,000
Rubber clothing	190	894,000
Automobile fabrics	128	642,000
Other rubberized fabrics	1,147	3,253,000
Hard rubber goods	572	2,268,000
Heels and soles	2,033	3,731,000
Rubber flooring	269	474,000
Sponge rubber	614	932,000
Sporting goods, toys, and novelties	585	1,673,000
Totals	25,017	$63,287,000
Grand totals—all products	115,850	$158,770,000

Inventory of Rubber in the United States and Afloat

	Long Tons: Crude Rubber on Hand	Crude Rubber Afloat
Manufacturers	129,771	11,429
Importers and dealers	77,664	44,640
Totals	207,435	56,069

*Number of rubber manufacturers that reported data was 184; crude rubber importers and dealers, 51; reclaimers (solely), 6; total daily average number of employes on basis of third week of October was 130,915.

It is estimated that the reported grand total crude rubber consumption is 82.1%; grand total sales value, 80%; the grand total crude rubber inventory, 90.8%; afloat figures; unavailable; the reclaimed rubber production 77.8%; reclaimed consumption, 71.8%; and reclaimed inventory, 52.6% of the total of the entire industry.

†Owing to the difficulty of securing representative sales figures this item has been discontinued.

Compiled from statistics supplied by The Rubber Manufacturers Association, Inc.

Rubber Goods Production Statistics

		1936 Sept.	1935 Sept.
Tires and Tubes*			
Pneumatic casings			
Production	thousands	4,035	3,067
Shipments, total	thousands	3,107	2,676
Domestic	thousands	3,053	2,621
Stocks, end of month	thousands	7,294	6,713
Solid and cushion tires			
Production	thousands	41	24
Shipments, total	thousands	36	20
Domestic	thousands	36	19
Stocks, end of month	thousands	71	37
Inner tubes			
Production	thousands	4,180	3,341
Shipments, total	thousands	3,427	2,775
Domestic	thousands	3,265	2,735
Stocks, end of month	thousands	6,988	6,127
Raw material consumed			
Fabrics	thous. of lbs.	16,989	12,606
Miscellaneous Products			
Rubber bands, shipments	thous. of lbs.	226	269
Rubber-proofed fabrics, production total	thous. of yds.	505	5,396
Auto fabrics	thous. of yds.	....	396
Raincoat fabrics	thous. of yds.	....	2,984
Rubber flooring, shipments	thous. of sq. ft.	591	431
Rubber and canvas footwear			
Production, total	thous. of prs.	6,003	4,427
Tennis	thous. of prs.	1,150	873
Waterproof	thous. of prs.	4,853	3,554
Shipments, total	thous. of prs.	8,063	5,510
Tennis	thous. of prs.	1,481	889
Waterproof	thous. of prs.	6,582	4,622
Shipments, domestic, total	thous. of prs.	8,039	5,489
Tennis	thous. of prs.	1,465	881
Waterproof	thous. of prs.	6,574	4,608
Stocks, total, end of month	thous. of prs.	14,567	14,559
Tennis	thous. of prs.	3,286	4,137
Waterproof	thous. of prs.	11,281	10,422

*Data for January to July, 1935, are estimated to represent approximately 97% of the industry; for August, September, October, November, and December, 1935, the coverage is estimated to be 81%.

Source: *Survey of Current Business,* Bureau of Foreign & Domestic Commerce, Washington, D. C.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Hard Rubber Co.	Com.	$1.00, resumed	Dec. 24	Dec. 11
American Wringer Co.	Com.	$0.25, resumed	Dec. 15	Dec. 7
Colly er Insulated Wire Co.	Com.	$0.35, increase	Dec. 24	Dec. 19
Dominion Rubber Co., Ltd.	Pfd.	$1.75 q.	Dec. 31	Dec. 18
Faultless Rubber Co.	Com.	$0.50 q.	Jan. 1	Dec. 15
Firestone Tire & Rubber Co.	Com.	$0.50	Jan. 20	Jan. 5
Firestone Tire & Rubber Co.	Pfd.	$1.50 q.	Mar. 1	Feb. 15
Fisk Rubber Corp.	Pfd.	$1.50	Dec. 20	Dec. 10
Garlock Packing Co.	Com.	$0.25 q.	Dec. 24	Dec. 12
Garlock Packing Co.	Com.	$0.37½, extra	Dec. 24	Dec. 12
Garlock Packing Co.	Com.	$2.00, stock	Dec. 24	Dec. 12
General Tire & Rubber Co.	Pfd.	$1.50 q.	Dec. 30	Dec. 19
B. F. Goodrich Co.	Com.	$1.00, resumed	Dec. 24	Dec. 19
Goodyear Rubber Co.	Com.	$20.00, coupon debenture		
Goodyear Rubber Co.	Pfd.	$4.50	.....	.....
Goodyear Tire & Rubber Co.	$5 Conv. Pfd., New	$4.25	Jan. 25	Dec. 18
Goodyear Tire & Rubber Co. of Canada, Ltd.	New Pfd.	$0.63 q.	Jan. 15	Dec. 31
Goodyear Tire & Rubber Co. of Canada, Ltd.	6% Pfd.	$0.62½ q.	Jan. 2	Dec. 15
Jenkins Bros.	Com.	$0.50 q.	Dec. 19	Dec. 9
Jenkins Bros.	Founders	$2.00 q.	Dec. 19	Dec. 9
Jenkins Bros.	Pfd.	$1.75 q.	Dec. 19	Dec. 9
I. B. Kleinert Rubber Co.	Com.	$0.40, special	Dec. 24	Dec. 14
Lima Cord Sole & Heel Co.	Com.	$0.37½, extra	Dec. 28	Dec. 24
Lima Cord Sole & Heel Co.	Com.	$0.12½ q.	Dec. 28	Dec. 24
Nat'l Rubber Machinery Co.	Com.	$0.20, initial	Dec. 28	Dec. 22
Pittsburgh Plate Glass Co.	Com.	$2.00	Dec. 21	Dec. 5
Plymouth Rubber Co., Inc.	7% Pfd.	$1.75 q.	Dec. 30	Dec. 15
Rex-Hide, Inc.	Com.	$0.50	Dec. 19	Dec. 18
St. Joseph Lead Co.	Com.	$0.25, special	.....	.....
St. Joseph Lead Co.	Com.	$0.25 q.	.....	.....
Thermoid Co.	New Pfd.	Stock	Dec. 28	Dec. 21
Thermoid Co.	New Pfd.	$0.75 q.	Dec. 28	Dec. 21
United Elastic Corp.	Com.	$0.15, extra	Dec. 24	Dec. 17
United Elastic Corp.	Com.	$0.15 q.	Dec. 24	Dec. 17
Washburn Wire Co.	Com.	$0.37½	Dec. 15	Dec. 8
S. S. White Dental Mfg. Co.	Com.	$0.25, special	Dec. 26	Dec. 15

World Net Imports of Crude Rubber

Year	U.S.A.	U.K.	Australia	Belgium	Canada	Czechoslovakia	France	Germany	Italy	Japan	Russia	Rest of the World	Total
1934	**439,100**	**158,500**	**9,600**	**9,100**	**28,400**	**11,000**	**50,400**	**59,300**	**21,400**	**69,900**	**47,300**	**60,500**	**964,500**
1935	**455,757**	**128,829**	**9,977**	**7,593**	**26,868**	**11,225**	**52,322**	**62,901**	**23,916**	**57,589**	**37,576**	**56,725**	**931,278**
1936													
Jan.	33,260	4,573	1,260	760	1,758	767	6,770	5,545	1,500*	4,357	467	5,121	66,138
Feb.	33,789	1,271	735	779	1,900	344	6,288	5,257	1,000*	3,305	94	5,268	60,030
Mar.	33,743	1,227	819	1,033	1,809	410	4,342	4,568	1,000*	5,172	4,376	5,433	61,478
Apr.	44,949	2,097	969	1,097	1,079	603	4,261	5,497	1,500*	4,931	3,251	4,723	70,763
May	35,549	302	1,053	698	2,221	667	4,342	4,639	1,000*	5,531	4,220	4,380	64,602
June	35,901	1,493	1,693	579	2,042	323	4,860	5,698	1,500*	4,567	2,427	4,176	62,273
July	38,556	766	1,455	713	2,274	495	4,631	6,837	2,000*	5,126	1,733	4,532	67,586
Aug.	41,094	1,581	762	789	3,780	989	4,522	6,556	1,500*	4,305	3,128	4,259	70,103
Sept.	49,483	12	2,336	513	2,393	624	4,402	6,006	1,500*	5,197	2,922	5,055	80,419

* Estimate. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*